

CHEMICAL AGE

PUBLIC LIBRARY

AUG 24 1948

VOL LIX

7 AUGUST 1948

DENRO15171

NICOTINIC ACID



NICOTINAMIDE



NIKETHAMIDE



Enquiries should be made to the

WHOLESALE AND EXPORT DEPARTMENT

BOOTS PURE DRUG CO. LTD. NOTTINGHAM

London Sales Office: 71 FLEET ST., E.C.4 (Phone: Central 6901-2)

The NOTTINGHAM THERMOMETER

CO. LTD.

PYROMETRIC EQUIPMENT

INDICATORS—Wall Type, Portable, Multi-point, Panel Mounting.
THERMO-COUPLES—Base & Rare Metals.
RESISTANCE THERMOMETERS.
COMPENSATING CABLES.
SHEATHS—Refractory, Steel, Alloy, etc.
SPARES—Wires, Elements, Insulators, Thermo-Couple Heads, etc., etc.

THERMOMETERS

GLASS STEM DIVIDED—Ranges up to 550° C. or 1,000° F.
GLASS IN VARIOUS METAL FITTINGS—Pipe Type, Jam, Varnish, Molten Metal, Quenching Bath, Bakers, Dyers, Flue Gas, etc.
DIAL VAPOUR PRESSURE — Flexible Capillary and Rigid Stem Patterns, etc.

== MANSFIELD ROAD ==
NOTTINGHAM, ENGLAND

Phone: 45815

ACIDS

★ NEW BUYERS
ESPECIALLY INVITED

- METAL FINISHING
NITRIC, HYDROCHLORIC, SULPHURIC, DIPPING ACIDS & SUNDRY CHEMICALS
- PROCESS ENGRAVING
NITRIC ACID, IRON PERCHLORIDE (LIQUID OR SOLID) SUNDRY CHEMICALS
- GARAGES, ETC.
ACCUMULATOR ACIDS (ALL STRENGTHS) DISTILLED WATER

GEO. F. BOOME & SON LTD.

STAR CHEMICAL WORKS
WATTS GROVE, BOW, E.3
PHONE EAST 2264-5

B.S.S.

334

CHEMICAL
SHEET LEAD
●
CHEMICAL
LEAD PIPE

COX BROS. & CO.

(Derby) Ltd.

LEAD WORKS,
DERBY

AND AT NOTTINGHAM

PUMPS

● FOR ALL PURPOSES ●

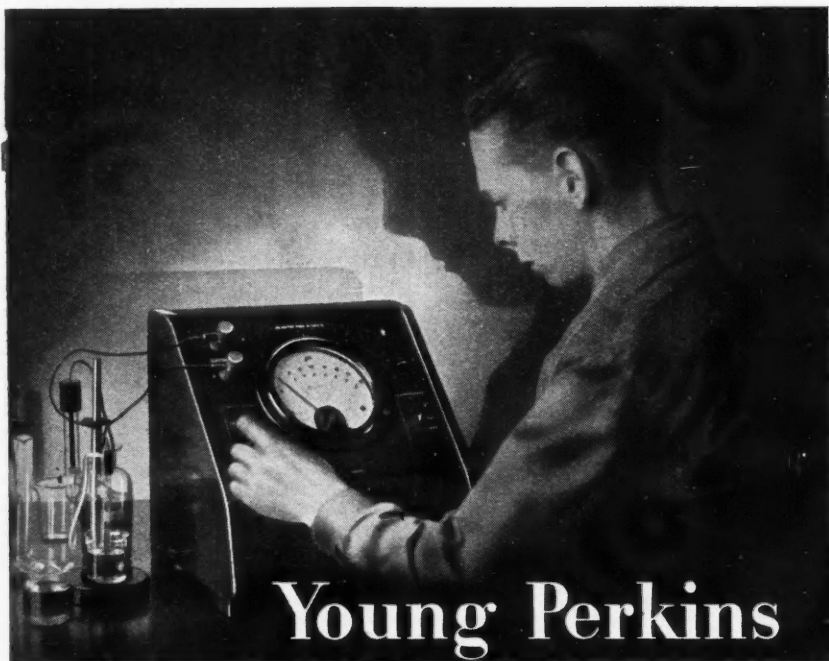
Centrifugal and Diaphragm
1½" to 4" dia.

PETROL, ELECTRIC OR HANDPOWER
NEW AND RECONDITIONED.
SALE OR HIRE.

RING GREENWICH 3189

THE
**GREENWICH PUMP
& PLANT CO., LTD.**

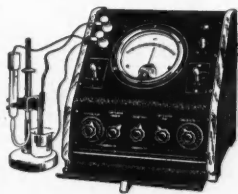
DENHAM ST., GREENWICH S.E.10



Young Perkins *takes the pH readings now!*

In the past the determination of pH was hardly a job for an unskilled or even semi-skilled worker. Scrupulous care, skill, accuracy of observation and a good deal of laboratory experience were required. But this is no longer true; with the Muirhead pH Meter the operator, once the setting-up controls are adjusted for the day, simply inserts the electrodes in the sample and presses the "read" key. The pH value of the sample is instantly shown by the pointer on the large and accurate scale; and even an unskilled youth can obtain results with Muirhead precision.

THE MUIRHEAD pH METER

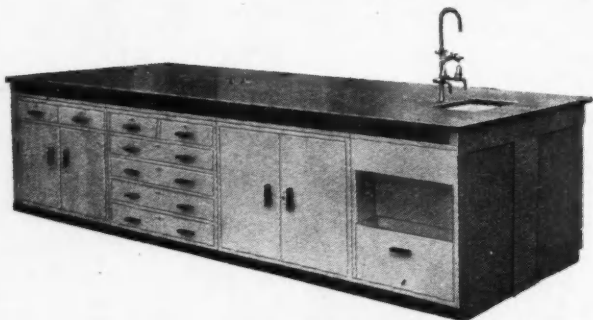


pH at the end of a pointer

Full description and specification of Mains and Battery operated units sent on request.
Muirhead & Co., Limited, Elmers End, Beckenham, Kent. Tel: Beckenham 0041.

C.R.C.3pa

METAL UNIT LABORATORIES



The bench shown comprises three different drawer and cupboard units and a waste bin unit. It can be fitted with all services including channels; wastes easily accessible.



VERSATILITY



FLEXIBILITY

B.T.L. unit metal laboratory furniture at present comprises nine different units which in various combination can be made up into laboratories to suit a wide range of individual requirements. They also allow for replanning and developing laboratories as needs change. They simplify the estimation of costs. Delivery is speedy and installation simple. Write for folder (CA3) giving full details.

BAIRD & TATLOCK

(LONDON) LIMITED

Laboratory Fittings Division

14-17 ST. CROSS STREET, LONDON, E.C.1

INDEX TO ADVERTISERS IN THIS ISSUE

	Page		Page
Accrington Brick & Tile Co.	204	Imperial Smelting Corporation, Ltd.	xi
Associated Lead Manufacturers, Ltd.	xv	Iodine Educational Bureau, The	xviii
Audley Engineering Co., Ltd.	203	Jenkinson, W. G., Ltd.	204
Baird & Tatlock (London), Ltd.	ii	Kestner Evaporator & Engineering Co., Ltd.	xviii
Baker Perkins, Ltd.	xiii	Kilner, John, & Sons (1927), Ltd.	204
Beecham Group, Ltd.	201	Lennox Foundry Co., Ltd.	xxiv
Blackwell's Metallurgical Works, Ltd.	192	Lord, John L.	Cover iv
Bolton & Hayes, Ltd.	Cover iii	Mirvale Chemical Co., Ltd.	xxiv
Boome, Geo. F., & Son, Ltd.	Cover ii	Monsanto Chemicals, Ltd.	v
Boots Pure Drug Co., Ltd.	Front Cover	Muirhead & Co., Ltd.	i
Braby, Fredk., & Co., Ltd.	iii	Nordac, Ltd.	xvi
British Celanese, Ltd.	vi	Nottingham Thermometer Co., Ltd., The	Cover ii
British Steam Specialties, Ltd.	xxiv	Organic Dyestuffs, Ltd.	xxiv
Callow Rock Lime Co., Ltd., The	Cover iii	Orr, Geo. W., & Co., Ltd.	xxiii
Castle Engineering Co. (Nott.), Ltd., The	Cover iv	Power-Gas Corporation, Ltd., The	ix
Chesterfield Tube Co., Ltd., The	x	Prodorite, Ltd.	Cover iii
Clayton, Son & Co., Ltd.	xvii	Pulsometer Engineering Co., Ltd.	xvi
Classified Advertisements	xx, xxi, xxii & xxiii	Reads, Ltd.	iv
Collie, J. H., & Co., Ltd.	xxiii	Robinson, F., & Co., Ltd.	xix
Cox Brothers & Co. (Derby), Ltd.	Cover ii	Sandiacre Screw Co., Ltd., The	xviii
Dryden, T.	xviii	Sarco Thermostats, Ltd.	ix
Dowson & Mason Gas Plant Co., Ltd., The	xii	Widnes Foundry & Engineering Co., Ltd.	vii
Farnell Carbons, Ltd.	xxiv	Yorkshire Tar Distillers, Ltd.	xiv
Foster Yates & Thom, Ltd.	xiv		
Genatosan, Ltd.	xii		
Greenwich Pump & Plant Co., Ltd., The	Cover ij		
Hackbridge & Hewittic Electric Co., Ltd.,	viii		
Harris, Francis W., & Co., Ltd.	xxiv		

"BRABY" STEEL DRUMS SINGLE TRIPPER & RETURNABLE TYPES

Our factory at Liverpool is designed and equipped for the production of high grade steel drums of many types, which can be supplied Painted, Galvanized, Tinned or Lacquer lined. Certain types can also be made from Stainless Steel.



FREDK. BRABY & Co. Ltd

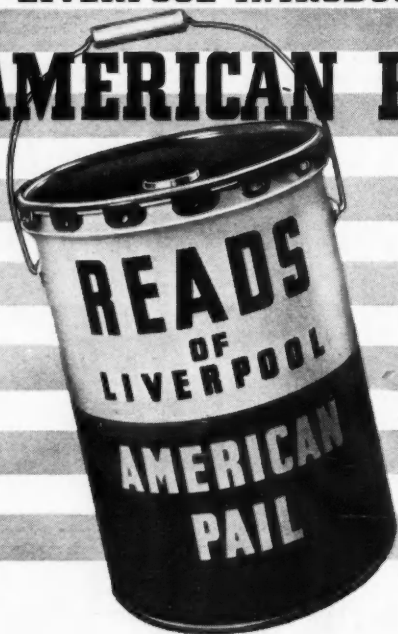
LIVERPOOL:
LONDON:
EXPORT:

HAVELOCK WORKS, AINTREE, LIVERPOOL, 10.
FITZROY WORKS, 352-364, EUSTON ROAD, N.W.1.
110, CANNON STREET, LONDON E.C.4
ALSO AT GLASGOW, BRISTOL, BELFAST & PLYMOUTH

TEL: AINTREE 1721
TEL: EUSTON 3456
TEL: MANSION HOUSE 4034



READS OF LIVERPOOL INTRODUCE... THE AMERICAN PAIL



Reads' American Pails are manufactured on similar plant to that used in the U.S.A., for the production of this package—the best Container of its class. The Pails are exact replicas of America's most popular heavier-gauge Container as regards diameters, type, handle and other features. They permit,

Note the necked-in bottom which stacks neatly and closely in the cover of the Pail underneath.

DIAMETERS

11½" immediately available as the material position permits—8½", 9½" and 13½" tools in course of manufacture. Heights up to 26". Gauge as required.



therefore, of a product being packed in an identical manner with its American counterparts—a helpful display and export feature. Reads' Pails are both air and liquid-tight—the gasket being of the flowed-in variety, a method about to be introduced universally in the U.S.A.

The cover is attached by means of a special tool (which Reads' provide) and can be removed with an ordinary screwdriver.

When used for liquids, the Pail can be fitted with any standard type of neck or fitting.

The standard American Bail handle is fitted for easy carrying.

READS OF LIVERPOOL

Manufacturers of Plain or Printed Tins, Cans, Kegs and Drums.

R3061-CI



AT EVERY IMPORTANT STAGE

of its manufacture every batch of every Monsanto chemical is carefully checked by highly specialised control chemists. Then on top of all that, not a pound or a pint of a Monsanto product is passed for dispatch or further use until it has undergone the most critical analytical tests. For full details of Monsanto's complete range of chemicals, write to : Monsanto Chemicals Limited, Victoria Station House, London, S.W.1.

MONSANTO
CHEMICALS

PHENOL . . . CRESYLIC ACIDS . . . PURE CRESOLS . . .
PHTHALIC ANHYDRIDE . . . BENZOATES . . .
SALICYLATES AND MANY OTHER
PHARMACEUTICALS . . . FLAVOURINGS . . .
PRESERVATIVES . . . GERMICIDES . . . ANTISEPTICS . . .
RUBBER CHEMICALS . . . DYE-STUFF INTERMEDIATES.

SERVING INDUSTRY WHICH SERVES MANKIND

'Celanese' TRADE MARK
**CHEMICALS
FOR
INDUSTRY**

**SOLVENTS
PLASTICIZERS
INTERMEDIATES**

The Celanese Organisation is able to supply a number of chemical products to a wide range of industries. These products include:

ACETAMIDE

ACETIC ACID

ACETIC ANHYDRIDE

CELLULOSE ACETATE

ETHYL ACETATE

ETHYLENE DICHLORIDE

ETHYL ETHER

GLYCOL ESTERS AND ETHERS

ISOPROPYL ETHER

METHYL ACETATE

METHYL CELLULOSE ('Celacol M' and
Celacol MM' in various viscosity
grades)

MONOMETHYLAMINE (free from di-
and tri-methylamines)

TRICHLORETHYL-PHOSPHATE

Research in the production of chemicals and their application is continuously in progress in the Celanese laboratories and enquiries are invited for the types of chemicals listed and products allied to them.

The Company's technical staff is available for consultations or discussion and correspondence should be addressed to:—

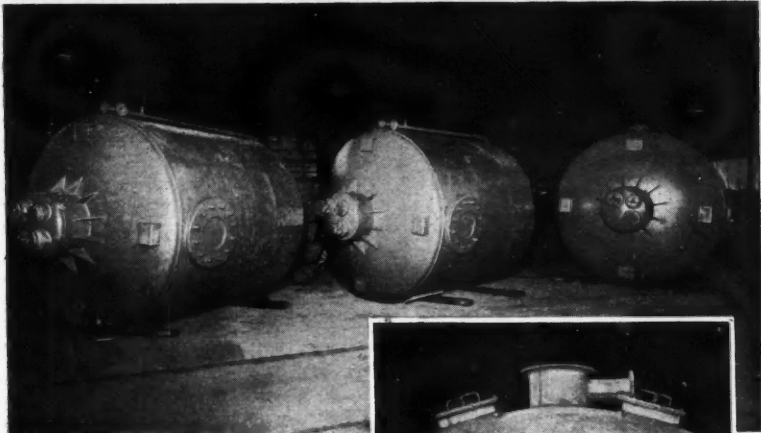
Chemical Sales Department,

BRITISH CELANESE LIMITED

CELANESE HOUSE, HANOVER SQUARE, LONDON, W.1.

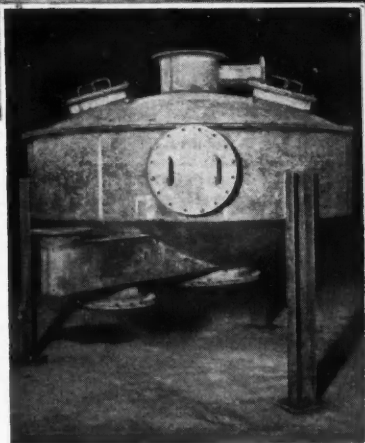
British Celanese Limited are the proprietors of the Trade Marks 'Celanese' and 'Celacol'

FABRICATION IN STEEL



The upper illustration shows a typical WIDNES job—fabricated mild steel viscose kettles, 7ft. 1in. diam. by 7ft. deep on the straight, part of an order for 25, fabricated in accordance with BSS 487

The engineering service offered by WIDNES-FOUNDRY includes fabrication in mild and stainless steels of specialised plant and equipment for the chemical, gas, oil and allied industries. The fabrication of Coolers, Condensers, Storage Tanks and similar constructional work is the logical parallel to production of special purpose castings for the industries mentioned. In foundry work and in fabrication in steel WIDNES offer a skilful, comprehensive service to industry.



The inset illustration shows an acetone plant absorber fabricated from $\frac{3}{8}$ in. plate : overall diam. 9ft. 6ins., weighing $4\frac{1}{2}$ tons.

WIDNES

FOUNDRY & ENGINEERING

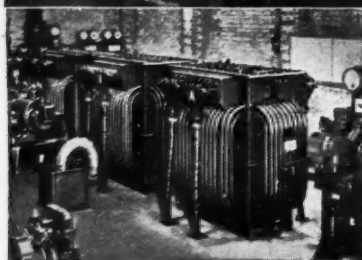
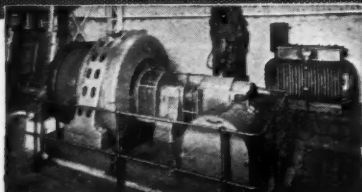
TELEPHONE CO. LTD. TELEGRAMS
WIDNES 2251 (4 LINES) FOUNDRY WIDNES

LUGSDALE ROAD · WIDNES · LANC'S

London Office : BRETENHAM HOUSE, LANCASTER PLACE, STRAND, W.C.2.

HACKBRIDGE TRANSFORMERS

for INDUSTRIAL POWER SUPPLY



RELIABILITY of electrical supply is especially vital in industries where continuity of process is of high importance.

TRANSFORMERS, whether for general distribution of power to the works or for supplying individual equipment, e.g., furnaces and heat treatment plant, should accordingly be the best available—which means HACKBRIDGE transformers.

The illustrations show :—

(Above) Hackbridge transformer supplying a compressor
(By courtesy, Messrs. Rubery Owen Ltd.)

(Below) Hackbridge transformers installed in a works sub-station.

HACKBRIDGE AND HEWITTIC ELECTRIC CO. LTD.
WALTON-ON-THAMES, SURREY

Telephone : Walton-on-Thames 760
Telegrams : "Electric, Walton-on-Thames"

Kestner's

SPRAY DRYING PLANTS

produce a uniform dry powder from solutions or solids in suspension in one operation. The drying is instantaneous and discharge of the finished product is continuous—thus enabling costly sensitive and organic materials like blood plasma or protein hydrolysates to be dried just as easily as metallic salts and industrial chemicals such as Magnesium Sulphate or Sulphonated alcohols.

There are many advantages to be obtained by using a spray drier in your process plant, but only a Kestner Spray Drier will ensure your getting the full benefit of the latest developments in spray drying technique.



Operating Platform

A large Spray Drier Plant in course of erection

Kestner's

CHEMICAL ENGINEERS

5 GROSVENOR GARDENS, LONDON, S.W.1

CHEMICAL AND GAS ENGINEERING CONTRACTORS

SPECIALISTS IN DESIGN AND
MANUFACTURE OF COMPLETE
PROCESS PLANT AND EQUIPMENT

FOR

- PRODUCTION, COOLING AND PURIFICATION OF INDUSTRIAL GASES
- WATER GAS, PRODUCER GAS, HYDROGEN
- CATALYTIC PROCESSING OF GASES
- REFINING AND HYDROGENATION OF OILS AND FATS producing EDIBLE AND INDUSTRIAL OILS, HARDENED FATS, VEGETABLE GHEE, FATTY ACIDS, GLYCERINE
- CALCINATION OF LIMESTONE, DOLOMITE AND MAGNESITE
- CAUSTIC SODA BY ELECTROLYSIS
 - SULPHURIC ACID
- AMMONIA AND METHANOL SYNTHESIS
- AMMONIUM SULPHATE AND NITRATE
- DUST AND FUME CONTROL AND RECOVERY
- INDUSTRIAL CRYSTALLIZATION

Although specializing in the above plants we are fully equipped to undertake other new and original projects.

We are prepared to collaborate in design and specifications of plants planned by clients right through to manufacture, erection and putting to work.

Illustrated bulletins describing the various types of plants available on request.

THE POWER-GAS
CORPORATION LIMITED

STOCKTON  ON-TEES

and London, Australia, Canada, India, South Africa

TEMPERATURE CONTROL ON PLATING PLANT

INSTALLATION DIAGRAMS

THE BEST ACCEPTED PRACTICE in thermo-static control on plating plant is condensed in a series of Sarco 'T' Drawings, listed below. No charge is made for the drawings.

Please use the request slip and insert the reference numbers of the drawings required.

DRAWING T.43.—Temperature control and steam trapping arrangements on hot swirl tank.

DRAWING T.44.—Temperature control and steam trapping arrangements on plating vat.

DRAWING T.45.—Temperature control and steam trapping arrangements on chrome plating vat.

SARCO
THERMOSTATS LTD.
CHELTENHAM, Glos.




To SARCO THERMOSTATS LTD.,
CHELTENHAM, GLOS.

Please supply, without charge, one copy each of

SARCO 'T' DRAWINGS, numbers.....

NAME

ADDRESS R848



These rollers were made for a Glass Rolling Plant. The advantage they have over ordinary rollers is that they were made by the Chesterfield process. In other words each roller is *one piece of metal* punched and drawn and finally machined into its exact final shape without a joint or seam anywhere. Like the wonderful four-hoss shay, there is *no* weak spot.

CHESTERFIELD tubes

If the product you want is basically a large steel tube Chesterfield will do the whole job for you - literally in one

THE CHESTERFIELD TUBE CO. LIMITED

CHESTERFIELD, ENGLAND · A  COMPANY

C.R.C. 15



SO_2

*Vanadium
Catalyst*

SO_3

A Product of

IMPERIAL SMELTING CORPORATION LTD.

37, Dover Street, London, W.1.

GENATOSAN LIMITED

Fine Chemicals

RECENT ADDITIONS:

84 Triketohydrindene Hydrate	-	A.	6/6	1 gm.
107 Mesitylene (Pure)	-	-	D.	50/- 500 gm.
108 Ψ -Cumene (Pure)	-	-	D.	38/- 500 gm.
42 Bromomesitylene	-	-	C.	104/- 500 gm.
43 Bromo- Ψ -cumene	-	-	C.	82/- 500 gm.
544 Nitromesitylene	-	-	C.	104/- 500 gm.

GENATOSAN LTD • LOUGHBOROUGH • LEICESTERSHIRE

Telephone: Loughborough 2292

^{The}
DOWSON & MASON
GAS PLANT CO. LTD.

MANCHESTER 19

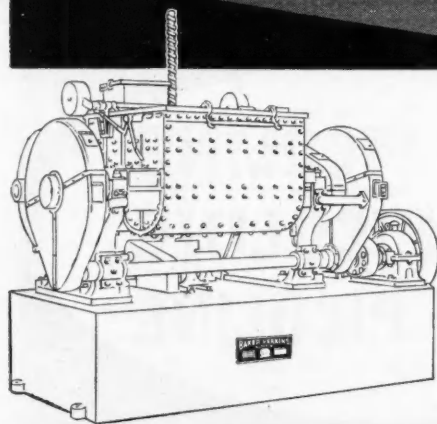
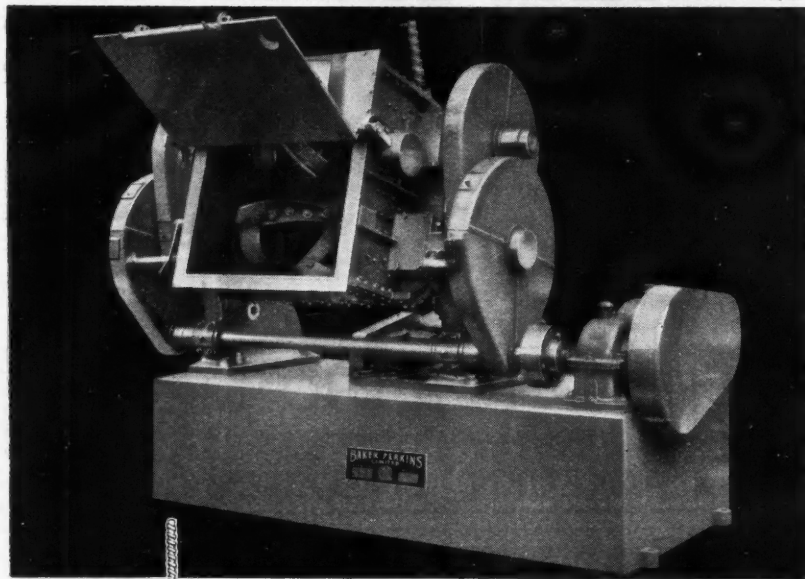
Tel. No. : Heaton Moor 2261



Illustration shows M.S. Rubber Lined Tank for Hydrochloric Acid

**TANKS. CYLINDRICAL AND RECTANGULAR
PUMPS AND FLOW METERS, ETC.**

UNIVERSAL MIXERS



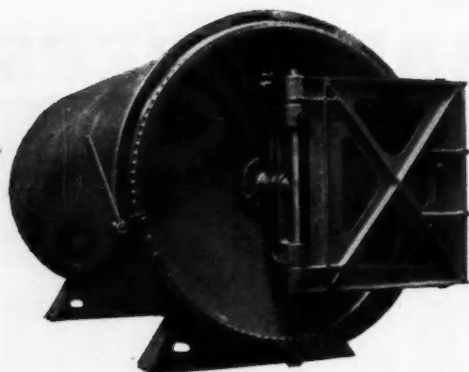
The Universal principle is capable of very many adaptations. Here, for instance, is a special machine for mixing Dry Battery Paste. Trough interior and blades are coated with rubber and renewable blade-shoes of hard metal are fitted.

BAKER PERKINS

Engineers

LTD

WESTWOOD WORKS - PETERBOROUGH



IMPREGNATING VESSEL FOR PRESSURE OR VACUUM
"F.Y.T." SELF-SEALING QUICK ACTING BOLTLESS DOOR

HYDRAULIC EQUIPMENT
HYDRAULIC & POWER PRESSES
CHEMICAL PLANT
RUBBER MACHINERY
WELDED FABRICATION WORK
CLASS "A" PRESSURE VESSELS
SHELL TYPE BOILERS
STEAM RAISING EQUIPMENT

FOSTER YATES & THOM LTD

Heavy Precision Engineers

BLACKBURN ENGLAND



**ALPHA PICOLINE
BETA PICOLINE
GAMMA PICOLINE**

**YORKSHIRE TAR DISTILLERS LTD
CLECKHEATON, YORKS.**

TEL. CLECKHEATON
790 (5 LINES)



TELEGRAMS TO -
YOTAR CLECKHEATON

LEAD

OR

LEAD PLUS

What do you ask of Chemical Lead? Resistance to corrosion comes first, of course — but what of resistance to creep and fatigue? And what about tensile strength?

In the last twenty years a lot has been discovered about lead. We know now how grain structure can be controlled by the addition of small quantities of other metals, and that it is just this control which gives the metal mechanical strength.

If you are interested in Chemical Lead, you may want to know more about this. Tell us the nature of your requirements. We can probably help you to meet them.

ASSOCIATED LEAD MANUFACTURERS LTD.

comprising :

The Cookson Lead and Antimony Company Ltd., Foster, Blackett and James Ltd., Locke, Lancaster and W. W. & R. Johnson and Sons, Ltd., Walkers, Parker & Company Ltd.

Enquiries to :

Associated Lead Manufacturers Ltd., Sales Offices at : Ibex House, Minories, London, E.C.3, or Crescent House, Newcastle-on-Tyne, or Lead Works Lane, Chester.

Pulsometer Pumps

ALL DUTIES

For

Food and

Chemical

Industries

and

Processes

LIST No. 3086

Pulsometer Engineering Co. Ltd.
110, Cannon Road, Reading

Rotary or Reciprocating

VACUUM PUMPS

for
Factory or Laboratory

Vacua obtainable
Single Stage—up to 0.01
m/m; Duplex—up to
0.0001 m/m off perfect

All Sizes & Types
for

High Vacuum
Displacement
Distillation
Moist Air
Circuits

Illustrated in our
8/50" Single Stage
Rotary Vacuum Pump



PULSOMETER-DOULTON STONWARE PUMP



Acid - Proof
Non-Porous
Will handle
most hot or
cold corrosive
liquids with-
out injury to the
pump. Free from
gland trouble.

CENTRIFUGAL PUMPS

made of
Stoneware and Special Metals

In all sizes for Food and Chemical
Industries and Processes.

Special Metal Pumps are made of special
corrosion resisting materials adapted to
pumped.

“NORDAC”

REGD.
SOFT RUBBER LINING OF OLD
OR NEW TANKS AT OUR WORKS
OR ON SITE

“VULCOFERRAN”

REGD.
SPECIAL EBONITE LINING FOR
HIGH TEMPERATURE WORK

DESIGN AND CONSTRUCTION OF SPECIAL PURPOSE
PLANT A SPECIALITY

NORDAC LIMITED

DUKES ROAD,
WESTERN AVENUE,
LONDON, W.3. Phone : ACORN 2289

The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

BOUVERIE HOUSE, 154 FLEET STREET, LONDON, E.C.4

Telegrams: ALLANGAS FLEET LONDON

SCOTTISH OFFICE:
116 Hope Street, Glasgow (Central 3970)

MIDLANDS OFFICE:
Daimler House, Paradise Street, Birmingham (Midland 0784-5)

Telephone: CENTRAL 3212 (16 lines)

THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Bann Brothers Limited

VOL. LIX
No. 1517.

7 August 1948

Annual Subscription, 26s.
8d. per copy; post free, 10d.

Help From America

THE unique gesture which the U.S.A. is making in defiance of all traditional mercantile usage to put the war-devastated nations of Europe on their feet is being widely applauded by all who see the Marshall Aid plan as essentially a utilitarian measure. As was to be expected, the plan has found also a very active body of critics, chiefly in those countries which have held aloof from its benefits and in which by common agreement it is represented as a commercial-imperialist plot. To these the most recent phase in the development of the rehabilitation scheme represented in this country by the proposed formation of an Anglo-American council to study the machinery and economics of industrial production here has become the focal point of a more concerted attack. Here, admittedly, the planners are on very much more controversial territory.

The industrial countries of the world are bound together by economic ties so close that, as experience has shown, the disappearance of one large industrial country from the economic map may upset the whole balance of world trade. The U.S.A. realises better than any other country that world trade can flow smoothly, and world peace be preserved, only if there is healthy industrial activity widely spread throughout all the established producing countries. To secure this the U.S.A. is prepared to spend money on an almost unparalleled scale. The first American loan was frittered away for reasons which we need not now discuss. It did little or nothing to

rehabilitate our industry. The same mistake must not be made a second time.

The Anglo-American Council on British Industry is designed to discuss whether there are ways and means by which particular industries in this country can derive benefit from co-operation with their opposite numbers in America. The proposal has been condemned in some quarters as a first-class blunder, not only because what suits American conditions will not necessarily be of any benefit here, but also because if advice is given and is not accepted the fact may be held to indicate that we are not making adequate use of Marshall Aid.

It is necessary that there should be clear thinking on this issue and equally clear recognition that much that is done by American industry is not possible here. Some, too, is wholly undesirable; the high level of inflation which has accompanied the payment of huge sums in wages in the pursuit of the largest scale of production is not a condition we want to emulate. Those who have recently been in the U.S.A. will know that in one respect that country and Britain are alike, namely, that in each country there are industrial concerns of the highest standard of efficiency and some with a very low standard, with the great majority lying between the two. A low-standard industry or undertaking in either country can learn from its opposite number in the other and even a highly efficient industry can learn something from an equally efficient counterpart in the other. There are already increasing

On Other Pages

Leader:		
<i>Help from America</i>	173	
Notes and Comments:		
<i>Disaster</i>	175	
<i>Export Contrasts</i>	175	
<i>I. G. Farben Sentences</i>	175	
<i>More Specialists</i>	176	
<i>Sharing the Burden</i>	176	
<i>Growth of New Scottish Chemical Enterprises</i>	176	
<i>Rapid Plant Erection</i>	177	
<i>Metallurgical Research Council</i>	178	
<i>Control of Dyestuffs</i>	178	
<i>Disaster at Ludwigshaven</i>	178	
<i>Canadian Sodium Sulphate</i>	180	
<i>Indian Petrol and Coal</i>	180	
METALLURGICAL SECTION		
<i>Electrostatic Precipitators</i>	181	
		<i>Magnetic Filtration of Lubricating Oils</i> 182
		<i>Davy-Faraday Exhibition in Paris</i> ... 183
		<i>Advance of Powder Metallurgy</i> ... 185
		<i>Electrolytic Deposition of Metal Powders</i> 186
		<i>Gas Carburation of Steel</i> 187
		<i>Sweden to Produce 300,000 M. Units of Penicillin</i> 188
		<i>Giant Pipe Bends</i> 189
		<i>Record Belgian Output</i> 189
		<i>Japanese Aluminium and Lead</i> ... 190
		<i>Increasing Corrosion Resistance</i> ... 191
		<i>South Africa's New Industries</i> ... 193
		<i>American Chemical Notebook</i> ... 194
		<i>Technical Publications</i> 195
		<i>Parliamentary Topics</i> 196
		<i>New Copal Plant</i> 201
		<i>Company Meeting Report</i> 201

numbers of examples of co-operation between American firms and British firms, which is proving advantageous to both. It would, therefore, be obtuse in the extreme to suggest that the U.S.A. has nothing to teach us—or that we have nothing to teach them.

There has, however, been plenty of evidence that a practice which is admirable in one country cannot logically be applied to the other. The coal mining industry is an outstanding example. The scale upon which American operations are conducted makes mass-production easier to accomplish economically than in this country. There are good grounds for doubting whether mass-production methods are suited to our needs, except in certain specialised directions. It may be said broadly that mass-production is the characteristic feature of American industrial enterprise, whereas craftsmanship, quality and skill are the merits upon which most of the success of British industry has been founded. In theory, it sounds very promising to suggest that the two should be wedded together; in practice it happens to be generally true that when mass production is introduced the quality of the product suffers.

There may, however, be ways in which we can learn from the U.S.A. how to reduce costs by more economical use of

labour, without sacrificing quality. It is essential that any council that is set up should proceed with caution in framing its recommendations to that end. The conditions of work in many American industries would horrify the British trade unionists, regardless of the high wages paid. Only industrialists of the highest standing in the industries concerned are likely to gain a hearing. The Federation of British Industries has given qualified approval to the scheme, no doubt on the principle of trying anything once. From the viewpoint of the chemical industry, it appears very doubtful whether an advisory council of this sort will prove of much value. If it is felt that the U.S.A. has something to teach us in the way of production, the familiar principle of selected teams from this country visiting their parallel industries in America to see for themselves and to discuss the possibilities of applying to this country whatever they find to be good is already producing good results. In many branches of industry the exchanges of technique between the U.S.A. and ourselves are already large, friendly and hopeful. There is, too, great scope for discussion at higher levels, as, for example, in seeking to balance the terms of trade, of which the adverse effect now robs us of much of the benefit of recent increases of production.

NOTES AND COMMENTS

Disaster

PENDING the report of a court of inquiry which has studied the testimony of experts, the circumstances in which acres of one of Germany's largest chemical undertakings, the I. G. Farbenindustrie at Ludwigshaven in the French zone, were reduced to smouldering ruins, with the loss of more than 200 lives, remains an unexplained reminder of the possibilities of disaster inherent in some large-scale chemical processes. That fact is fortunately well recognised in this country, and that has undoubtedly helped in a very large measure to fend off the cataclysmic eruptions which have been known in the U.S.A. and most of the industrial countries of Europe. Preliminary reports point to a conflagration in the lacquer shops of the Badische Anilin Soda Fabrik as having been in effect the detonator which set off after a short interval the chain of great explosions in the neighbouring heavy chemical plants, where substantial quantities of nitrogen, paints and dyestuffs and sulphuric acid, among other things, must have added to the appalling tale of devastation. If any lesson is to be drawn in advance of the official findings, the siting of great, potentially explosive plants without the most ample fire-breaks is obviously to be avoided at all costs, even when, as in this case, the benefit of the Rhine waterway invited the construction of contiguous installations for several miles. In addition to the dreadful penalty in death and suffering, the reduction to chaos of so much of Germany's capacity for the production of much needed chemicals is a deplorable result.

Export Contrasts

CHEMICALS and drugs stand high in the list of U.K. industrial products which contributed to raise the volume of exports in the second quarter of this year to 134 per cent of the average figure in 1938, eight per cent more than was achieved in the three months January-March. The export percentage of chemicals and related materials during April-June of 1956 was appreciably larger than all except nine of the 26 main groups of which the record has now been published by the Board of Trade. All groups, excepting

vehicles and certain raw materials have yet to achieve varying percentage increases before attaining the export targets which have been set, and in this connection the chemical group has travelled farther than almost all others, being within eight per cent of that goal. Such progress entitles the most optimistic view to be taken of the prospects of reaching by the end of 1948 the monthly overseas sales total of £8.05 million. With export sales of a declared value of £20,992,000 in the April-June quarter, chemicals, drugs, dyes and colours are revealed as one of this country's most productive sources of revenue, yielding significantly almost exactly twice the return obtained from the revived export trade of the State coal industry.

I.G. Farben Sentences

FADING recollections have been revived of the detestation felt by all who were outside the Nazi-Fascist conspiracy for the great German chemicals and metals combine, I. G. Farbenindustrie. The reminder was provided by the announcement by the American tribunal in Nuremberg of sentences on 13 of the I. G. Farben principals, charged with theft of industrial property in the countries victimised by Nazi aggression and with the exploitation of slave labour. The comparative leniency of the sentences, ranging from 18 months to eight years and permitting the immediate release of Max Ilgner, Hans Kugler and some others who had already been in custody for periods longer than their sentences, seems to be a reflection of the more dispassionate view with which we can now regard the ruthless industrial machine which a few years ago threatened our very existence. Without the eager co-operation which I. G. Farbenindustrie offered, the Wehrmacht could not long have sustained its thrusts through the body of Europe, nor, in all probability, would the chief architect of destruction have been emboldened in his attempt to subjugate the world. The I. G. Farben leaders were extremely lucky that the impartiality of their accusers and judges permitted them to stand trial for offences against society on a smaller scale, and apparently gave them the benefit of the doubt whenever reasonable doubt existed. Thus passes into

history the most nearly successful attempt to conduct an industry with utter disregard of human values. Now that some of the chief conspirators have been punished, rational recommendations for a more productive use of much of the I. G. Farben chemical machinery will perhaps get a more realistic reception.

More Specialists

THE steady elimination of the post-war "sellers' market" and the substitution of keen commercial competition, based upon the quality of products, has been the characteristic of current commercial affairs. British industry, to meet the international trade challenge, must be armed with all the scientific and technical skill the country can muster. Fears have been expressed by leaders of various industries that the training of these sorely needed technicians will fall so short of the required numerical level that the coming years may witness the spectacle of British industrial enterprise crippled by lack of key-men. All the more gratifying, therefore, are the commendable efforts of the Northampton Polytechnic, London, to provide, under the auspices of its Department of Applied Chemistry, an important supple-

ment of scientific and technical training for chemical students.

Sharing the Burden

AT negligible cost students can avail themselves in the coming winter sessions, of part-time day and evening courses in both pure and applied chemistry and the newly published prospectus strikes an enterprising note by including courses in glassworking. Very few facilities for scientific and technical training in this sphere exist at present. Other new studies include special lecture courses in the technology of fuel and refractory materials. In the latter connection the acute shortage of refractory materials is acting as a serious impediment to the establishment of new branches of chemical industry and the extension of existing activities. Northampton Polytechnic appears determined that this material shortage shall not be further aggravated by a lack of trained personnel. The Polytechnic and similar institutions are performing a real service in assisting to relieve the burden imposed upon the universities in supplying technicians at a time when they are most needed.

GROWTH OF NEW SCOTTISH CHEMICAL ENTERPRISES

THE site at Grangemouth for the erection of a large plant to produce petroleum based chemicals has been surveyed and approved and work will begin as soon as sufficient labour and materials are available, probably next year.

The complete project will cost about £12 million and the new factory will be operated by British Petroleum Chemicals, Ltd., for which the capital has been subscribed by Anglo-Iranian Oil Co., Ltd., and the Distillers Co., Ltd.

Imperial Chemical Industries, Ltd., and a subsidiary of Anglo-Iranian Oil Co., Ltd.—Scottish Oils, Ltd.—are also associated with the enterprise.

Shale Oil Output

The last named firm—responsible for Scotland's shale oil industry—now provides employment for 4000 operatives and staffs and the following monthly production figures

indicate the extent of present operations: Two million gallons of diesel oil for road vehicles; 800 tons of wax; six million gallons of motor spirit; 400 tons of paraffin coke, and 1700 tons of sulphate of ammonia fertiliser.

In addition, the slag remaining after the extraction of oil is used for the production of bricks and this type of building material was used extensively in the construction of the company's Pumpherstoun plant.

One of the more interesting products which have become available as a result of the research carried out jointly by the staffs of Scottish Oils, Ltd., and Anglo-Iranian is "Iranopol," the synthetic detergent for the production of which a large commercial plant was erected at the Pumpherstoun refinery, which now produces two million gallons of "Iranopol" a year for use in the engineering, tanning, dyeing, and paper-making industries.

RAPID PLANT ERECTION

Mass-Production Concrete Method in Sweden

SUCCESSFUL development is reported from Sweden of a mass-production method of fabrication in concrete of a type likely to be of direct use in the erection of chemical plant, such as large-scale liquid containers and chemical processing columns.

The "Prometo" method—reports the *Anglo-Swedish Review*—has been developed by two Swedish civil engineers, Erik von Heidenstam and Emrik Lindman. So far, it has been used mainly for the construction of grain and green fodder silos, although the method lends itself admirably for many other purposes. Thus, early this year a 120 ft. high twin silo structure for blast furnace slag was completed at the Björneborg ironworks in Central Sweden, and other recent constructions include oil tanks, concrete columns and water towers.

This concrete casting method has been put on the market by AB Produktionsmetoder, of Stockholm, after several years of practical tests and is based on the employment of "self-raising" moulding equipment of a special design.

The main parts consist of sliding steel moulds made in sections for easy assembly and dismantling. The sections are fixed to

a frame, which also carries a platform from which the concrete casters work. The concrete is hoisted to this platform and poured into the mould by means of distributing gear turning round the centre of the platform.

The entire equipment with moulds platform, and workers is raised 1 in. every five minutes by means of hydraulic power jacks, and normal casting speed is thus about 1 ft. an hour.

It takes only about 50 hours, the *Review* records, for three men, working in shifts of two, to build the walls of a silo 30 ft. high, using the "Prometo" method. One man mixes the concrete, while the other, on the platform, distributes it in the mould, places the reinforcing rods in the concrete, and operates the hydraulic hoisting gear.

Concrete mixer, hoist and pressure oil pump for the hydraulic power jacks are electrically-driven, and no scaffolding is required during casting or dismantling. In the building of larger blocks of silos, the work is carried on by six men working in three two-men shifts, and they can complete, say, one 70 by 15 ft. grain silo in a week.

The thickness of the walls is generally 5 in., which is less than the normal for similar constructions; hence consumption of concrete is considerably reduced. The moulds can, however, be adjusted for the casting of thicker walls, if required.

These structures are stated to compare favourably in respect of quality and strength with the products of other building methods.



The process in operation.

Extension Plans in Austria

Plans to increase industrial activities in Upper-Austria include an enlargement of the Stickstoffwerke, Linz, which at present produces 60,000 tons of nitrogen yearly, and is intended to produce double that amount. The programme also includes the production of urca and methanol as well as 20,000 tons per annum of calcium carbide, in association with nitrocalcite fertilisers, and of polyvinyl chloride to be used by the Sempert works for artificial rubber.

A proposed extension of the Aluminium Works, Ranshofen, depends on the possibility of importing 120,000 tons of aluminium oxide. The production of silumin and of electrolytic antimony is also contemplated.

Metallurgical Research

Inter-Services Council Set Up

THE Admiralty and the Ministry of Supply have set up an Inter-Service Metallurgical Research Council to advise them on metallurgical problems of importance to the Services.

The formation of this council, states the Ministry, will provide for the interchange of ideas on metallurgical problems common to the different Services, and avoid overlap between their research programmes. It should also ensure that balance is maintained between fundamental and *ad hoc* research, and that the long-term research necessary for the provision of new alloys is embarked upon.

The Research Council includes representatives of the Admiralty and Ministry of Supply, and a number of distinguished metallurgists from the universities, industry, and other Government departments. The independent members are:—

Prof. L. Aitchison (Professor of Industrial Metallurgy, University of Birmingham); Prof. E. N. da C. Andrade (Quain Professor of Physics, University College, London); Prof. G. Wesley Austin (Goldsmiths' Professor of Metallurgy, Cambridge University); Mr. G. L. Bailey (director of the British Non-Ferrous Metals Research Association); Dr. R. W. Bailey (research consultant, Metropolitan Vickers Electrical Co., Ltd.); Mr. H. H. Burton (director of research, English Steel Corporation, Ltd.); Dr. W. Hume-Rothery (lecturer in chemistry, Oxford University); Dr. H. Moore; Mr. A. J. Murphy (research director, J. Stone & Co., Ltd.); Mr. D. A. Oliver (director of research, B.S.A. Group); Dr. C. J. Smithells (director of research, British Aluminium Co., Ltd.); Dr. C. Sykes (director of research, Brown Firth Research Laboratories); Dr. W. H. J. Vernon (Chemical Research Laboratory). The secretary is Mr. A. H. Waterfield of the Ministry of Supply.

CONTROL OF DYESTUFFS

DYESTUFFS and certain materials used in their manufacture will require an export licence under a new Board of Trade Order which came into operation on August 4.

This action, says the BoT, has been taken in consultation with the manufacturers and has been necessary in order to ensure adequate supplies to industries producing goods for export, particularly textiles.

Applications for licences should be sent direct to: Board of Trade, Dyestuffs Control, Guardian Chambers, 28 Blackfriars Street, Manchester, 3.

Anglo-Swedish Trade.—Discussions between the U.K. and Sweden have resulted in agreement being reached on an expansion of Swedish exports to this country including chemicals, pitprops, newsprint, paper and some manufactured goods.

Disaster at Ludwigshaven

Death Roll Believed to Exceed 200

A WEEK after the largest of the I.G. Farben chemical plants in Germany was swept by fire and a series of explosions, likened in their devastating effect to the dropping of an atomic bomb, no precise information was to be had of the cause or of the number of lives lost.

The first reports received in this country on Thursday last week related how at 2.45 p.m. the previous day, fire and explosions occurred in the lacquer workshops of the Badische Anilin Soda Fabrik, the I.G. Farben establishment at Ludwigshaven where more than 20,000 are engaged in the production of heavy chemicals, including sulphuric acid, nitrogen, dyes and paints. Three heavy explosions occurred and flames spread with great rapidity through the vast, closely built-up industrial area, which stretched for several miles along the west bank of the Rhine, until they reached a menthol plant. Then four further explosions resulted, the force of which is indicated by the fact that windows were smashed and slates stripped from the roofs in Mannheim on the farther bank of the Rhine.

Sudden Havoc

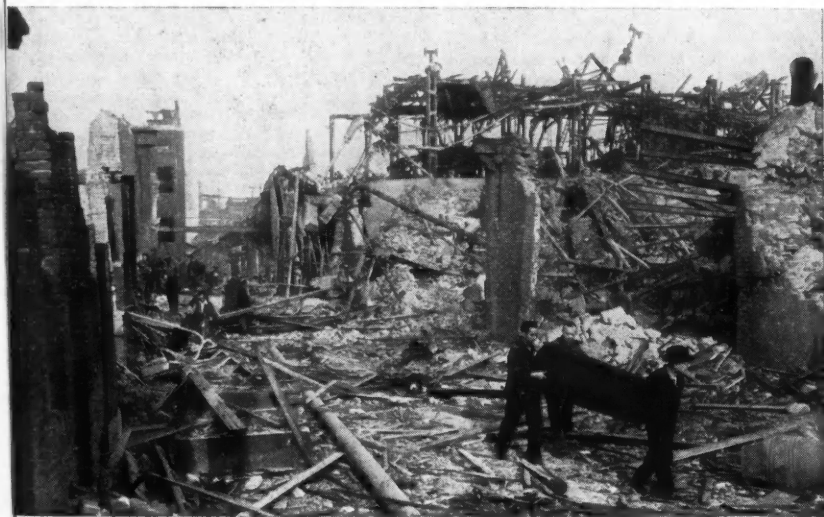
Because of the speed with which the flames swept over the great factory area, and the collapse of buildings under blast from the explosions, the toll in deaths and casualties was exceptionally high. First reports alleged that many hundreds had perished in the ruined buildings. Late this week, when it was still not possible to announce the final number with certainty, it was stated more or less authoritatively that between 200 and 250 had lost their lives, and in the hospitals were more than a thousand casualties.

Many of these had been badly cut with flying glass or affected by the suffocating fumes and gases liberated by the explosions or generated by the flames and the mixture of chemicals. This asphyxiating effect, which necessitated the large American Army fire-fighting force from Mannheim wearing respirators, may have added considerably to the death roll, incapacitating many who might otherwise have escaped.

While no authoritative verdict has been given on the cause or results of the disaster, some statements have suggested that initial detonation may have been due to the heat of the sun on escaping ethyl chloride gas, and that thereafter phosgene gas may have been spontaneously produced. Rumours that some of the plants involved were engaged in the production of recognised explosives have been officially denied.



These pictures, taken soon after the flames were quelled, are evidence of the extent of the destruction wrought by flames and blast in last week's disaster in the heart of the I. G. Farben plant. In the first picture, German police are seen searching for bodies at a point where stood a six-story building which was filled with workers when the outbreak occurred. In the picture below, one more victim is being removed from the main building area, in which the original explosion occurred



Canadian Sodium Sulphate

150,000 Tons a Year from
Natural Sources

A NEW publicly-owned sodium sulphate plant at Chaplin, Regina, Canada, has been opened by Mr. T. C. Douglas, the Saskatchewan Premier, who said in his address that the event "marked an important milestone in the development of the Province's sodium sulphate deposit of Lake Chaplin." Mr. Douglas set in motion the first car of salt cake destined for Nova Scotia. The new plant, constructed at a cost of \$1 million, will produce 150,000 tons per year of sodium sulphate of exceptional purity.

Developed from an idea of the manager, Mr. A. E. Holland, a brining process is being employed. During the warm weather, when the lake contains a 50 per cent solution of sodium sulphate, the brine is pumped through a 600-ft. ditch line from the lake into three vast reservoirs. As the weather becomes cooler the salts form crystals which drop to the reservoir bottoms where by late fall a weak brine is left. This weak solution is then drained off and a crystal bed of sodium sulphate four or five feet thick remains. During the winter these crystals are harvested by bulldozer and dragline, and stockpiled. After processing to remove any water, dry, powdered sodium sulphate remains.

Largest Canadian Plant

The first production line in the Chaplin plant—the largest and best equipped plant of its kind in North America—was completed in May. A belt conveyor, 1100 ft. long and 2 ft. wide, carries the raw salt from the stockpiles to the refinery where it is drawn from a bin by screw conveyors into four evaporators. Here the raw material is melted in its own water of crystallisation, and the anhydrous salt which drops to the bottom is drawn off to a special filter.

All but 10 per cent of the moisture is removed by the filter, the remaining 10 per cent being evaporated in a 60-ft. rotary dryer. The salt cake is then screened and ground to a fine powder which is conveyed to steel bins, each 40 ft. in diameter and 40 ft. high, where it is stored prior to shipment.

Used primarily in the production of kraft paper, which gets its extra toughness from sodium sulphate, the demand for the salt cake has greatly increased in recent years. The chemical is also used in soap detergents or "soapless soaps," as a mordant in dyeing, in stock feeds, and in the separation of

(Continued at foot of next column)

Indian Petrol and Coal

U.S.A. and Czechoslovakia to
Collaborate

AT the invitation of the Indian Council of Industrial and Scientific Research, a number of U.S. oil experts have arrived in India to advise upon the proposed establishment of a synthetic petrol industry.

Their report, which will be ready by mid-September, will contain estimates of capital expenditure and production costs, and a suggested lay-out of the new plant, which will probably be erected at Bihar.

Coal Consumption

Preliminary Indian reports have calculated production costs on the basis of one ton of synthetic petrol from seven tons of coal and the proposed annual target figure of one million tons of petrol would utilise one quarter of the country's current yearly coal output.

The Indian Government is now considering three measures to overcome the shortage of petrol and by-products. These are, the extraction of oil from coal, compulsory mixture of power-alcohol with petrol and the construction of refineries to process crude oil from the Middle East.

Other foreign experts visiting India at present are members of a Czechoslovakian technical mission which is preparing a series of reports to the Indian Government on the better use of coal reserves, for the chemical and metallurgical industries and power generation.

The first survey produced by the Czechs states that by the introduction of modern combustion equipment, capable of burning coals with a high-ash content, the reserves of "workable" coal in India could be increased three-fold.

Grading System

It is also suggested that washing and screening plants—built of imported equipment from Czechoslovakia—should be erected in the Bihar and Bengal coalfields and a more careful grading system be introduced at the coal-producing centres.

The report also recommends that all coal with an "ash-fraction" of 30-50 per cent should pass to the power stations and the higher grade coals producing less ash should be used for metallurgical or chemical purposes.

copper and nickel during the refining process.

The market for the product covers many parts of the world and it is shipped, usually in bulk carloads, as far east in Canada as Bathurst, Nova Scotia, and as far west as Vancouver, B.C.

NEW ELECTROSTATIC PRECIPITATORS

Aiding Industrial Efficiency and Smoke Abatement

EXCEPTIONALLY high efficiencies not previously obtained in the recovery and removal of entrained solid or liquid particles from industrial gases are claimed to have been achieved with new electrostatic precipitators recently introduced to American industry by the Koppers Company, Inc., of Pittsburgh, Pa., which is manufacturing the precipitators in the United States under licence from the Swiss firm, Elex S.A.

In all cases where the new precipitators have undergone complete tests they are reported to have exceeded guaranteed efficiencies—not less than 95 per cent in tests covering full 24-hour periods, including operation when collected material is discharged from the electrodes. The precipitators appear, moreover, to permit an important advance in measures to solve the problem of smoke eradication from industrial cities. Maximum removal of solids or liquids from industrial gases to meet the increasing demand for minimum residuals exhausted to the atmosphere requires very advanced electrical precipitation technique.

For Specific Requirements

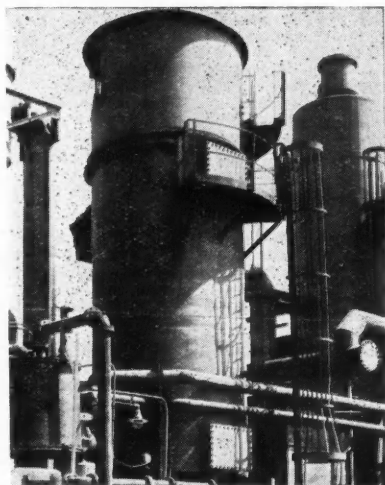
For some time now the eradication of smoke has been an urgent problem for U.S. industries, and many larger cities have passed smoke abatement ordinances. While residuals permissible under widely varying ordinances range from .25 gr. to .75 gr. per cu. ft., .25 gr. is being urged as the maximum acceptable residual. Many corporations, however, are calling for a maximum of .15 gr. per cu. ft. and such residuals are not possible with most conventional equipment.

The new precipitators are designed to meet specific requirements in the following categories:—

1. For removal and recovery of tar oil and water from coke oven, producer, and carburetted water gases. The precipitator also serves the necessary purpose of gas refinement, thereby materially improving over-all plant operation.

2. For cleaning blast furnace gas to improve its efficiency as a fuel in the operation of stoves, coke ovens, generators, boilers, etc. Varying degrees of cleaning are required. Modern stoves, with smaller tile openings, and coke ovens of the underjet type require considerably lower residuals than other equipment.

3. For precipitation and recovery for use of dry dusts from gases arising from



Koppers-Elex precipitator installed at a U.S. chemical plant where it is used to remove acid-mist. This type of apparatus is finding a wide application in the process industries, notably in oil refineries and in the extraction of fluorides from burning black liquor

kettles, mixers, dryers, conveyors, and grinding mills.

4. A type for use in the process industries. In such applications, the precipitators remove and/or recover acid mist, oil refinery catalysts, salt cake or soda ash from burning black liquor in sulphate processes, fluorides, aluminium hydroxide, carbon black, etc. All such elements recovered, except acid mist, are valuable.

5. A precipitator for use in metallurgical operations. In such installations valuable metallic products are recovered from gases emanating from reverberatory, electric, roasting, and sintering furnaces.

6. A most important type of the new precipitator is offered for the removal of fly ash from power plant boiler gas. The main function of this unit is to abate nuisance and enable power plants to comply with strict municipal ordinances.

Some official results of tests with Koppers-Elex precipitator installations show: a soda ash recovery precipitator at a Southern pulp

and paper mill. Specified volume—70,000 cu. ft. per minute; actual volume approximately 90,000 c.f.m. specified efficiency—90 per cent; recovery efficiency = 95+ per cent. The guaranteed recovery of soda ash under specific conditions was 9.7 tons per day; actually, it averaged, it is said, 14.96 tons per day.

Gypsum recovery from calcining kettles in an East Coast plant: Volume of gas—4500 c.f.m. for each of four. Tests on four precipitators show from 98.7 to 99.8 per cent efficiency; 97 per cent efficiency was guaranteed.

Detarrer precipitators at an eastern manufactured gas plant: Guaranteed efficiency—95 per cent; actual efficiency—98 to 99.2 per cent. Saleable tar was recovered

A blast furnace type precipitator at a

mid-western steel plant: Gas volume—80,000 c.f.m.; guaranteed efficiency—95 per cent; actual efficiency—98.5 to 99.4 per cent; required residual .015, actual residual—.002 to .00048 gr. per cu. ft.

Research and Development

The precipitators for solid particle removal are designed for periodic rapping to discharge the dust from the collecting electrodes in a single gas lane at a time, with the dust required to fall a maximum of 26 in. before passing out of the gas stream. This drop reduces to a minimum the re-entrainment. Such rapping is actuated by clock-timer controls. The electrical power units for the precipitators are of two types—one known as the "Elex-Pak," and the other as the "Vac-Pak," for which no special substation is required.

Magnetic Filtration of Lubricating Oils

EFFECTIVE treatment of a common industrial problem, the filtration of lubricating oils, is being given exacting tests on the London Midland Region of the British Railways. Here the problem was to eliminate ferrous contamination in the lubricant of two new diesel-electric locomotives designed to draw expresses at speeds up to 100 m.p.h.

The filtration equipment was entrusted to Philips Electrical, Ltd. Two filter units are in use in the No. 10,000 locomotive now running daily between London and Derby, and a further two were fitted to the "sister-ship," No. 10,001, which was lately completed at the works at Derby.

The filters are fitted in the main lubricating oil circuit of the 16 cylinder, 1600 h.p. engine component of each locomotive. The oil enters the filter from the scavenger pump, and, on leaving it, goes to the oil cooling radiator. The flow capacity that each filter deals with is, 1500 gallons per hour. Each filter will trap ferrous contamination in the oil flow down to a particle size of 1/25,000 in. and, by removing such contamination prevent oxidation of the oil, and considerably lengthen its effective lubricating life.

The filters are small, measuring only 12½ in. by 6½ in. by 5½ in. and can therefore be comfortably accommodated in any intricate construction without interference with the layout.

The design of the filter unit is ingenious in that the ferrous particles do not touch the magnet itself. In construction a powerful permanent magnet is surrounded by filter cages which are not in themselves magnetic. They become magnetised only when gripped in position by the magnet and

they attract to themselves the metallic particles held in suspension in the oil.

The reason for the design is to enable cleaning to be carried out speedily and effectively. To do this, it is necessary only to slacken the bolts holding the cover in position and to remove the complete assembly. The filter cages can then be forced away from the magnet and immediately lose their magnetism and the contamination falls away. A quick wash in paraffin removes the last traces. Replacements should take not more than five minutes.

It is understood that trials of the engines will be conducted in the autumn, matching the diesel-electrics against steam locomotives of comparable power, for hauling and speed capabilities.

Better Supplies of Edible Oils

A Press note from the Ministry of Food, commenting on the distribution of olive oil and teaseed oil, now being privately imported in much larger quantities than they were last year, observes that there is no statutory control of the prices and the distribution of these oils is unrestricted except that a licence is needed to wholesale olive oil. Selling prices are considerably lower than those ruling last year, olive oil being sold at about 30s. per gallon in bulk from importers. Supplies of refined teaseed oil later in the year should be on sale at prices lower than those for olive oil.

DAVY-FARADAY EXHIBITION IN PARIS

France Commemorates Fundamental Research

From a Special Correspondent

A PLEASANT surprise awaited any British chemist recently in Paris who chose to visit the famous Palais de la Découverte. In recent weeks the main display there has been a Davy-Faraday Exhibition housed in the Great Round Hall close to the entrance. The principal emphasis, naturally, rested upon telecommunications and power transmission, but there was much to interest the chemist and metallurgist.

For the serious student there were displays of original apparatus and experiments; for the curious schoolboy, ingenious adaptations of the classic experiments; while for those who like their educational pill sugared, there were "human interest" exhibits.

The exhibition was in three concentric circles around a statue of Faraday. At the foot of the statue were show-cases containing original apparatus or copies. In the second circle was apparatus set up for experiments which were carried out by demonstrators. Around these in turn were exhibits of industry's uses of basic principles discovered by Davy and Faraday. Overhead and around the hall appeared great murals comprising portraits of the men and *montages* of various consequences of their work.

Whole groups of apparatus had been lent by London's Science Museum and the Royal Institution. They included Faraday's apparatus for gas liquefaction—a manual compressor, connecting tubes and a refrigerated receiver. Samples of gases liquefied by

Faraday himself, which were on view, comprised arsine, cyanogen and hydrobromic acid. The first sample of benzene separated by Faraday in 1825 was displayed, with the distillation apparatus used for its isolation.

In a series of ferrous alloys there is evidence that even the greatest of scientists have their experimental failures. Faraday aimed at preparing unrusting steels, based on the observation that meteorites, known to contain nickel, were less subject to oxidation than ordinary iron. Accordingly, he prepared nickel-iron alloys and attempted to prepare alloys containing silver, platinum and aluminium, of which the last had not been isolated. No practical useful results were obtained.

This was the experience, too, with experiments on the improvement of optical glass. Lead borates and borosilicates were almost exclusively used, on the grounds of easy fusibility and high dispersive power. Unfortunately, the products were never usable for telescopic lenses as had been hoped.

Original samples of gold sols and films of colloidal gold were on view. They were prepared in the course of research in 1856 into the way in which light was affected in passing through suspensions or thin films.

Faraday's Laws were illustrated by three voltmeters filled with dilute sulphuric acid and passing different currents which were clearly indicated on large ammeters. The tubes were calibrated and thus showed the direct relationship between rate of gas evolution and current.

(Continued overleaf)



This was part of Faraday's apparatus for measuring dielectric constants

There was a demonstration repeating the original famous experiment of Davy in which he electrolysed caustic potash and observed "small globules having a high metallic lustre . . . similar in visible character to quicksilver.

Various experimental lamps constructed by Davy showed the development of his ideas towards the final famous Safety Lamp surrounded by metal gauze.

Industrial Applications

In the outermost circle, demonstrators showed visitors electrolytic polishing of brass in phosphoric acid, or nickel plating, or anodising and dyeing of aluminium. A pH meter and an electro-metric titration unit formed part of a display of electrolytic test and analysis apparatus.

Electrothermal effects were shown by models of furnaces used in the aluminium industry, including one of the first Héroult furnaces.

Industrial electrolysis was represented by

a model section of a cell for the preparation of chlorine.

"Human Interest" Features

Adjoining the main hall were small exhibits mainly of the "human interest" category. Here was to be seen a moving letter of thanks to Sir Humphry Davy from the miners of Whitehaven for his Safety Lamp. There were several other letters, medals, portraits and originals of pamphlets and journals. Faraday's microscope and slide rule and note-books of both these workers were also to be seen.

A novel type of exhibit, in an adjoining alcove, was a reconstruction of Faraday's study and a corner of his laboratory at the Royal Institution.

As one surveyed the exhibition as a whole it amply confirmed the director's words in his preface to the exhibition catalogue:—"These exhibitions place on record the beneficent rôle of science when man does not turn it to evil ends."

Eliminating Phosphorus : Swedish Iron Ore Process

SWEDISH iron interests, the Grängesberg Company, are credited with having successfully developed an individual method of eliminating phosphorus from iron ore. For this company, the largest iron mine-owners in Sweden, the process is of special importance, because of the high phosphorus content of most of its material.

The process—reports the *Anglo-Swedish Review*—will use iron ore from the mines of Central Sweden which, unlike the Lapland mines, yield ore of a fairly high phosphorus content. When purified, this ore can be used for the manufacture of spongy iron, which is gradually replacing pig iron for steel production.

The process used by the Grängesberg Company consists principally in concentrating the ore and extracting the phosphorus by acid treatment. The company has tested the method on a small scale for about a year and is now building a large de-phosphorising plant.

Saving Charcoal

The modernisation and expansion being carried out in Swedish mines and ironworks aim not only at increased production, but also at the manufacture of cheaper and better steel, said Mr. E. Wijkander, managing director of the Bofors undertaking, in a recent speech at a mining congress in Sweden. The development of an economical method of producing sponge iron in large quantities has for many years presented metallurgists with a difficult problem.

The methods which have been successfully

tried in Sweden for some time past constitute a practicable and economic solution of the problem. In these processes, the "Höganäs" process and the Söderfors-Wiberg method, malleable iron is obtained direct by the reduction of the ore, the temperature being too low to allow the iron to melt.

Direct from Ore

The product contains very little carbon and is not suitable for the manufacture of bar iron, but it has been found most useful as raw material for the production of steel by the open-hearth and electric process. Whether sponge iron can be used economically depends on its price and quality, as compared with those of other raw materials for steel production.

"There are many signs of a revolution in the supply of raw materials in this field," Mr. Wijkander declared. "Sponge iron will replace charcoal pig-iron," he predicted, "which also means that the demand for charcoal will diminish. This is a desirable development in our present situation."

Paint Apprenticeship Scheme.—The Paint Apprenticeship Council (THE CHEMICAL AGE, July 10), has appointed a sub-committee to implement the apprenticeship scheme and prepare a programme. That committee has now met and is actively engaged in preparing details of the technical education facilities in the various paint centres of Britain.

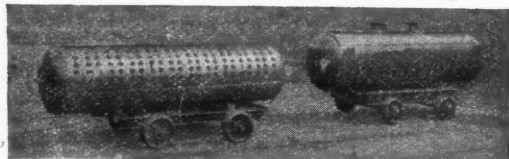
Metallurgical Section

Published the first Saturday in the month

Clayton, Son & Co., Ltd.

MOORE END, HUNSLET, LEEDS, 10

Telephone: Hunslet 75226-9
Telegrams: Gas, Leeds

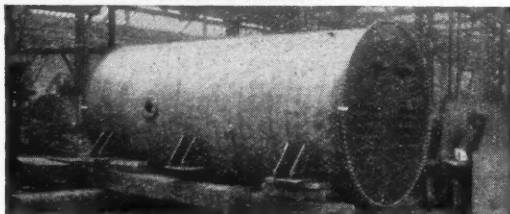


Drums for
Water Tube
Boiler

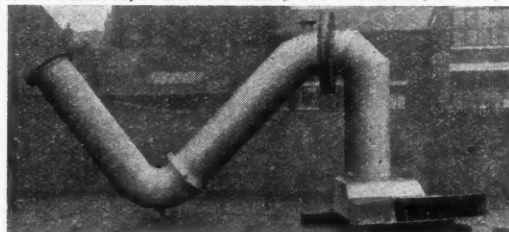
○

Sludge Heater
for
Sewage
Treatment

○



CHEMICAL PLANT, PLATE WORK OF EVERY DESCRIPTION, TANKS, OIL REFINING PLANTS, STEAM BOILERS, GAS-HOLDERS, STILLs, WELDING SPECIALISTS

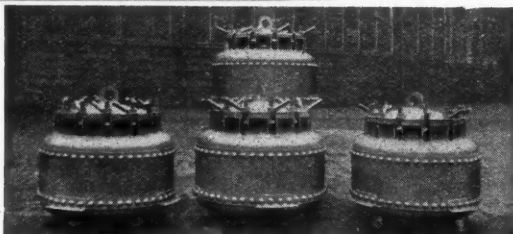


Large Diameter
Welded Pipes
for
Chemical
Works

○

Group of
Mild Steel
Pressure
Filters

○



LONDON OFFICE:
ABBAY HOUSE, 2 VICTORIA STREET, S.W.1

ASHTED 502
Telephone: Abbey 1754

T. DRYDEN

COMPLETE LABORATORY FURNISHER

— FOR —
**PURE
 CHEMICALS AND ACIDS**

THERMOMETERS

—
**SCIENTIFIC
 APPARATUS & GLASSWARE**

HIGH CLASS FURNISHING

South Wales Distributor for all
**PRINCIPAL APPARATUS
 MANUFACTURERS**

LANDORE • SWANSEA

PHONE SWANSEA 3469

**TWO MILES OF COD BELOW**

THERE is more food in the shops because of iodine. Echo sounders, which in war tracked submarines, now record shoals of fish on iodine impregnated paper like that used in the "Asdic" device.

To chart the invisible under water is only one of iodine's varied services. Iodine is used in heat-sensitive paints, dyes, insecticides, infra-red and three-dimensional photography, bactericidal detergents, paper and textile technology. Possibly iodine could solve a technical problem for you.

You are invited to consult the Iodine Educational Bureau. Its world-wide information service on the scientific and technical uses and possibilities of iodine and its professionally qualified staff are at your disposal. There is no charge.

**Iodine Educational Bureau**

14 STONE HOUSE, BISHOPSGATE, E.C.2

Specialists in
STAINLESS STEEL

We manufacture Bolts, Nuts, Studs etc. in all classes of Stainless and Heat-resisting Steels from bar materials.

SANDIACRE
 SCREW CO. LTD.

Metallurgical Section

7 August 1948

ADVANCE OF POWDER METALLURGY

Current Practice and Theory Reviewed at Graz

FAVOURED with 70 papers by technicians and scientists, the first International Powder Metallurgy Congress in Graz, July 12-17, emphasised the importance of the effect of recent work on this subject and fully established the fact that powder metallurgy commands an essential place in the field of general metallurgy.

A great audience attended the lectures and discussions which were held in seven sections, dealing with: 1. Manufacture and properties of powders; 2. Sintering; 3. Test methods for sintered and unsintered powders; 4. Manufacture, properties and applications of sintered products; 5. Hard metals; 6. Sintered magnets and magnetic materials; 7. General principles and allied fields of powder metallurgy.

The papers gave fundamental backgrounds as well as practical applications and brought up-to-date much that has already been published. They described most of the problems encountered and the methods of overcoming them. Some of these papers have been published in the *Powder Metallurgy Bulletin*, edited by Dr. Paul Schwarzkopf and sponsored by American Electro Metal Corporation, 320 Yonkers Avenue, Yonkers 2, N.Y. They were brought before the Congress for discussion only. The full text of all the papers will be published in the future issues of the *Oesterreichische Chemiker Zeitung*, Vienna, and afterwards in book form by the Academic Press.

British Contribution

Among the contributions by English workers were "A Contribution to the Knowledge of the Ternary System, Tungsten-Carbon-Cobalt" by L. D. Brownlee, Manchester; and "The Preparation and Some Properties of Alloys of Titanium and Tungsten Carbide," by A. G. Metcalfe, Cambridge.

The first of these gave some important results of examining a series of sintered alloys by X-ray diffraction. A temperature of 1350°C was chosen for this investigation. Since the alloys examined were necessarily at room temperature, it was not possible to say definitely that the

results obtained were representative of the constitution of the alloys at the sintering temperature.

However, by sintering for various times to reach equilibrium and cooling rapidly, where necessary by quenching, it was possible to obtain a series of results which enabled a ternary diagram to be constructed. This diagram shows a large area which is liquid at 1350°C, a very large three phase region WC+C+liquid, and an interesting series of phase fields in the tungsten-rich corner of the system.

The single phase region η , having a complex-crystal structure, was shown and its relation to the normal cemented carbide structure clearly brought out. Finally, photo micrographs of typical cemented carbides were displayed, showing some of these structures.

Carbide Studies

In his study of titanium and tungsten carbide, A. G. Metcalfe briefly discussed the effect of titanium carbide on the cutting properties and structure of cemented carbides, and gave a short outline of the preparation and sintering of this type of hard metal. The conditions which are necessary for the preparation of oxygen-free and carbon-saturated titanium carbide were discussed, and compared with the methods at present used industrially.

Some results were given of a determination of the section from WC to TiC of the ternary equilibrium diagram Ti-W-C at temperatures up to approximately 2900°C, using metallographic and X-ray diffraction methods. These results are now supported by measurements of the electrical resistance.

The structure of these carbides is investigated by the measurement of the density and of the X-ray diffraction intensities, and by indirect evidence from the lattice parameters of low carbon- and oxygen-containing titanium carbide. The marked divergence of the lattice-parameter, c , composition curve was discussed, some theories advanced to explain this, and 13 lantern-slides shown.

An American contribution, by W. E.

Kingston, New York, provided new light on the mechanism of sintering of powdered metal compacts. It recalled that so far no entirely acceptable theoretical treatment had been advanced to explain the mechanism by which powdered metals are transformed into homogeneous sintered bodies. This state of affairs has undoubtedly retarded advancement in this field.

It is understandable that so little progress has been made in such fundamental studies, since experimental proof has been difficult to obtain, due to the unfavourable mechanical properties of partially sintered compacts, which have previously prevented accurate structural analyses during the progress of the reactions.

In the author's opinion, one of the chief factors in the present unsatisfactory state of theory of the mechanism of sintering is that most workers have preferred to treat the phenomena occurring in this process as anomalous as compared with the proved mechanism occurring in reguline metals, thereby making it much more difficult to develop a clear-cut integrated theory of the

sintering process which would withstand critical examination.

In this paper, the first of a series, a basic theory of the mechanism of sintering is given, with an explanation of the fundamental principles involved, as well as the presentation of experimental techniques and data.

This theory is based on the well known principles of self-diffusion in metals, as evidenced by nucleation, stress relief, and grain growth. The hypotheses involved could equally be applied to the cold bonding of massive metals, as in cold welding of strips, etc.

The author has been able to develop metallographic techniques, which have allowed more intimate study of behaviour of the individual metal powder particles during the sintering operation, and thus has been able to apply this important tool in substantiating his hypothesis. He has also used to good advantage in his studies of such phenomena electron microscopy, X-ray diffraction, and other conventional test methods.

Electrolytic Deposition of Metal Powders

AS pointed out in the powder metallurgy symposium of the Iron and Steel Institute last year, few outstanding inventions can now be expected in this field, and progress will be gradual.

Any new development, though slight, may, however, form the subject of a single patent and several of these together may constitute an appreciable advance. This will probably apply to the 14 patent applications in the name of Davide Primavesi, of Lugano, Switzerland (Eng. Pat. Appn. Nos. 34519-34532/1947), but until a process has been tried out on an industrial scale it is difficult to assess its practical value.

Three of these applications relate to metal powder production (Nos. 34519-20 and 34527/1947) and the remainder to compacting (sintering, moulding, etc.).

Deposition Process

The first two relate to improvements in electrolytic deposition of metals as powders (34519) and in the purification or concentration of magnetic powders (34520).

The former describes methods whereby an anode is used containing the metal to be deposited and electrolyte containing halogen compounds of metal to be deposited. This latter (electrolyte) may be a salt melt or solution, and if an alloy is required in powder form the melt may contain two or

more halogen compounds. The anode similarly may consist of two or more metals. The process applies more particularly to iron and iron alloys, but is not necessarily limited in this respect.

Better Control

Special attention has been paid to iron ion concentration. It can be controlled by introducing the halogen into the bath in gaseous form, or mixed halogens or compounds; and in this way the grain size of metal deposited can also be controlled. *e.g.*, large cube form crystals are obtained suitable for metallurgical purposes. Through controlled ion concentration the voltage, too, may be kept low, thus preventing precipitation of the more electropositive metals—sodium, or sodium and potassium.

In an example, the electrolyte was of NaCl and KCl at a temperature of 750°; potential difference was 4 v, whereby fine almost amorphous powder was obtained. A slow stream of chlorine gas was introduced deep down in salt melt through an iron tube and after a few litres had been passed voltage was down to 1.9. It then rose slowly again and after 4.8 hours, during which it had increased by about 0.5 v, chlorine was again introduced for a few minutes, resulting in reduced potential.

GAS CARBURISATION OF STEEL

Affording Precise Control and Rapid Processing

CARBURISATION of steel may be carried out with solid, liquid or gaseous media. Although it is probably true that the use of solid carburisers is more widespread, the claims of gas carburising—particularly where precise control is essential, and where large components are to be processed—merit consideration.

Equipment now available permits low processing costs and a short time of treatment, as well as possessing advantages of compactness and cleanliness. The principles and plant are reviewed in detail in the current technical information sheet issued by Wild Barfield Electric Furnaces, Ltd.

Where "natural gas" is not obtainable, carburising atmospheres are normally of the high hydro-carbon type, suitably diluted, and may consist of butane or propane diluted with charcoal burner gas, raw town's gas or burnt town's gas. Such hydro-carbons possess the characteristic of "cracking" on the steel surfaces at temperature, and give rise to carbon deposition which takes the form of a hard adherent scale. This results

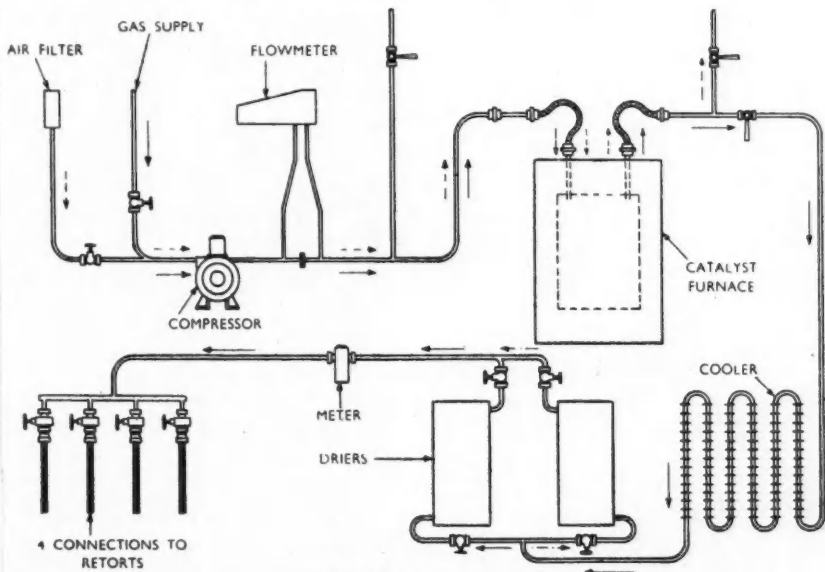
in retardation of the carburising rate and fouling of retorts. Such conditions prevent precise control of the carburising process for the "stopping-off" effect of the deposit may vary, and unless such control is available, the full benefits of gas carburising cannot be utilised.

Two courses may be adopted, viz., (1) a balanced mixture of hydrocarbon/diluent gas must be achieved with sooting restricted as much as possible, or (2) the gas must be diluted sufficiently to eliminate sooting completely.

The latter course, however, results in carburising below the maximum rate, with the danger of under-carburising the less favourably disposed parts of the charge and consequent lack of uniformity throughout. The time for carburising must also be increased, and it is impossible to avoid a steep carbon gradient inwards from the surface of the steel.

There are other important factors, each with a bearing on the rate of carburisation. These include:—

(a) The temperature at which the treat-



The control and treatment of the gas is illustrated in this diagrammatic view

(Courtesy of Wild Barfield Electric Furnaces, Ltd.)

ment is carried out (even minor temperature changes can have marked effects);

(b) The length of time the material is under treatment. (Case depth is proportional to the square root of the carburising time when the surface carbon potential and diffusivity co-efficient are constant; and

(c) The rate of the flow of the gas. This is particularly important where a balance has to be struck between two atmospheres, with the object of preventing deposition of too much carbon and ensuring that carburisation proceeds at the maximum rate for any given temperature. With prepared town's gas, the rate of flow is not at all critical provided a certain minimum is exceeded for a given plant size.

There are, therefore, certain conditions which must be satisfied before gas carburising can be used to full advantage. These may be summarised briefly as follows:

(a) Constant and uniform temperature of the actual work and an exact knowledge of that precise temperature; and

(b) A satisfactory gas composition.

To meet these requirements a non-variable atmosphere is essential. The prime carburising constituents of raw town's gas, methane and carbon monoxide, are ideal, for they do not leave a hard deposit on the surface of steel at temperature. Raw town's gas, however, also contains carbon dioxide, oxygen, water vapour and small amounts of organic sulphur compounds which make it unsuitable for carburising unless it is treated. A process has accordingly been developed to remove the deleterious constituents of town's gas without, however, serious interference with its carburising constituents.

The action of the catalyst in the process may be seen from the typical analyses of town's gas before and after passing through the catalyst:—

	Raw town's gas Per cent.	Prepared town's gas Per cent.
Carbon dioxide	3.3	—
Oxygen	0.6	—
Unsaturated hydro-carbons	2.1	0.6
Carbon monoxide	16.4	20.2
Methane	24.0	23.6
Hydrogen	49.5	51.2
Nitrogen (balance)	4.1	4.4
	100.0	100.0

It will be seen that the methane content is only slightly reduced and there is a considerable increase in the amount of carbon monoxide. Town's gas supplies vary according to the method of production, but invariably, if the methane content is low, the carbon monoxide content is correspondingly high.

From the diagram reproduced it will be seen that town's gas direct from the mains is fed to a compressor, through a flow meter to a special catalyst passing an air cooler to driers and then direct to the carburising retorts.

The gas from the catalyst exit passes through the air cooler to silica gel driers, of which one only is used at a time so that the plant can be operated continuously. Regeneration of the silica gel is effected by a low temperature treatment in a small forced air circulation furnace. After passage through the drier, the gas goes via an inferential meter to the carburising retorts.

Sweden Prepares to Produce 300,000 M. Units of Penicillin

PENICILLIN manufacture, hitherto principally carried on by Britain and the U.S.A., has recently been established in Stockholm, Sweden, by the opening of a factory by Karnbolaget AB., a subsidiary of the large brewing concern Stockholms Fryggerier AB. This company, says the *Anglo-Swedish Review*, has one of the largest biochemical laboratories in the country.

It has been stated authoritatively that the plant is capable of supplying the entire needs of Sweden, which in 1947 consumed about 300,000 million international units, excluding penicillin for veterinary purposes.

The three main departments of the plant are concerned with fermentation, extraction, and drying. During the fermentation stage, the penicillin-producing fungi is permitted to grow under suitable conditions for three days, and then removed by filtration, which leaves a low-percentage solution

of penicillin. In the extraction department the filtrate is purified by means of solvents, and the solution concentrated from 6000 to 7000 litres to about 10 litres, when it contains 10 to 20 per cent penicillin.

The final stage in the manufacturing process is the drying, which must be performed at a temperature of -30°C . owing to the delicate nature of the penicillin at ordinary temperatures. The frozen penicillin solution is evaporated at a pressure of 0.00002 kg./cm.², leaving it as a dry powder. Finally, the penicillin is bottled in a "pressurised" room by special personnel working in ultra-violet light and taking every possible precaution against contamination of the product.

The entire staff of the new plant consists of just over thirty people, mainly employed in laboratory work, control and packing, the actual process of penicillin manufacture being almost wholly automatic.

Pipe Bends

Departure from Welding Technique

THE bending of a pipe large enough to house an automobile has been accomplished by a new machine recently perfected by the M. W. Kellogg Company, engineers and steel fabricators, New Jersey, U.S.A.

According to the firm's technicians, large-diameter pipe bends produced by the apparatus were found to be of higher quality than those fabricated by the conventional welded segment process.

Wartime Problem

During the war the advent of giant petroleum refining plants necessitated the use of large-diameter piping, but at that time bending apparatus throughout the U.S.A. could be applied only to pipes with a maximum diameter of 34 in. Bends larger than this had to be fabricated of segments welded together—an expensive and lengthy operation.

In addition, bends of this type showed a tendency to corrode rather rapidly and crack at points where internal stresses were unavoidable, due to the welding of the five or six segmental sections of the bend. Although these faults could be minimised by

the use of stress-relieving heat treatments, engineers realised that it would be far more efficient to make a continuous, smooth bend from one piece of large diameter pipe.

The Kellogg apparatus is claimed to be capable of dealing with pipes up to a diameter of 100 in.

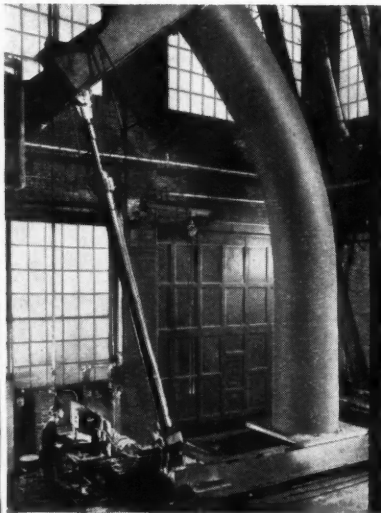
Hydraulic Pressure Used

The process bends pipe in the hot state under hydraulic pressure and is equally adaptable to small and large diameters, thin and thick walled pipe, and short or long radius bends. It is currently being employed to fabricate 50-in. pipe bends for the carrier lines of large oil refining units.

The use of the new method is said to result in improved products, better performance and reduced maintenance costs. The smooth, even bend is claimed almost to eliminate erosion and eddy currents due to sudden changes in direction or to sharp-cornered fillets which act as stress raisers.

The pipe is bent while hot and then cooled slowly, the stress remaining constant throughout the bend, thereby minimising the effects of stress corrosion.

The process is expected to be widely used in the production of pipe-bends for steam, gas and hydro-electric plants, wind tunnels and petroleum refinery installations.



Claimed to be the largest one-piece bend ever made, the curvature is being applied to this 50-in. pipe by hydraulic pressure and heat treatment

Record Belgian Output

IN a recent special supplement devoted to Belgian commerce and industry the *New York Herald Tribune* states that Belgium's chemical industry, now accounting for 12 per cent of the country's exports, has broken all pre-war production records. Emphasis at present is placed upon increased synthetic production resulting in more finished products with a higher unit value.

Fertilisers occupy an important place among chemical exports and output is considerably higher than in 1947. The production of sulphuric acid has already reached the pre-war level of one million tons a year, while production of sodium sulphate, a principal raw material of the Belgian glass industry, has reached a yearly level of 100,000 tons. Roughly 20 per cent of the world's production of copper sulphate comes from Belgium, and current production is estimated at 80,000 tons a year.

Among the important mineral salts produced in Belgium at the present time are zinc chloride, calcium chloride, ammonium chloride, phosphates, iron sulphate, zinc sulphate, and uranium salts, and although output is never revealed it is hinted that mines in the Belgian Congo are producing 90 per cent of the world's uranium ore.

Japanese Aluminium and Lead

Rapid Development Based on Ample Power Supplies

THE development of the Japanese non-ferrous metals industry, much of which had its principal period of development in the '30's and was greatly accelerated in the war years and those immediately preceding them, is described at length in recent official U.S.A. publications, which also throw some light on the limited revival which has been permitted since the occupation.

The background of Japan's aluminium industry has been made the subject of a full-length review (76 pp.) of information supplied by U.S. Foreign Service Offices and others, "Aluminium Metallurgy in the Japanese Empire." This observes that before 1938 Japan was a substantial importer and consumer of aluminium. After 1938 production matched consumption, at about 20,000 tons annually, and five years later the Japanese Empire was fourth in the world as a producer of aluminium, with 150,000 tons in 1943, the peak year.

During 1941-45 aluminium produced in Japan itself was valued at 1.6 times more than copper, the next non-ferrous metal in order of value. Most of the raw materials for production of alumina and aluminium were imported.

The basis of Japan's aluminium industry, like that of the other great producers, the U.S.A., Canada, and Germany, was its ample supply of low-cost electric power. With the exception of the North American producers, all had to import bauxite, the raw material of virtually all aluminium.

Production methods varied little from those used in America and Europe, whence processes and equipment designs were borrowed. Alumina-manufacturing practice favoured American methods and used American-designed equipment almost exclusively. Reduction of alumina to metal followed European practice more closely. The Söderberg continuously-formed, self-baking electrode, as yet little used in the United States, was generally preferred to the solid electrode cell. A marked tendency towards the use of high-current cells up to 40,000 amperes developed.

As the supplies of bauxite and other imported raw materials became difficult to maintain in war, Japanese metallurgists resorted to desperate means for processing Manchurian aluminous shales and domestic materials, including clays and alunite. These efforts were uneconomic and resulted in few new techniques of value to peacetime competitive production. Possible exceptions may be the calcium aluminate method for alumina, which was operated successfully

with aluminous shale by Japanese engineers in Manchuria, and some success in production of alumina from shale was attained by a direct-fusion process, using the electric furnace. Neither process was originated by the Japanese. They did not master the lime-soda-sinter process for alumina.

Production of aluminium was suspended when Japan surrendered. Production of secondary aluminium from scrap was resumed early in 1946 and attained a production-rate of about 10,000 tons towards the end of that year.

The report describes in detail the 14 existing plants, their current position and outlook. It contains 20 illustrations, numerous tables and a comprehensive bibliography.

Japanese Lead Metallurgy

With the introduction of Western methods of removing impurities from lead ores, refined lead production in Japan increased tenfold in the 15 years before her military collapse, according to a U.S. Bureau of Mines report describing lead metallurgical practices in Japan. Actual production of refined lead jumped from 3227 tons in 1925 to 38,048 tons in the peak war year, 1944. In 1945 production dropped to 12,468 tons. A number of refining plants were damaged by American bombing.

Two smelting and refining plants, one at Kamioka, and the other at Hosokura, were responsible for two-thirds of the total lead output of Japan proper. Other plants are located at Aizu, Murakami, Ashio, Chigirishima, Takehara, and at Saganoseki. These plants also treated a considerable bulk of scrap metal. A description of the metallurgical methods used at each of the eight plants and production figures are presented in the report.

More than 90 per cent of Japanese refined lead has been produced by the Betts electrolytic process, which was introduced at the Hosokura plant in 1937. Used also in British Columbia, this process has proved suitable for treating lead containing bismuth and such impurities as antimony, arsenic, copper, gold and silver. The Parkes and Harris processes also were introduced in the '30's and used successfully.

Japanese lead reserves, known and probable, are estimated at about 268,000 tons of metallic lead, according to the U.S. report. The report contains a bibliography, maps and charts and is supplied free from the bureau of Mines, Publications Section, Forbes Street, Pittsburgh 13, Pa.

INCREASING CORROSION RESISTANCE

Recent Tests with Stainless Steels

By H. SEYMOUR

MUCH valuable work has been done recently on stainless steels, particularly the 18:8 variety, to increase their resistance to corrosion, and to make them available to a larger number of industries where the corrosion problem is severe.

The corrosion resistance of stainless steels is usually attributed to "passivation" of the surfaces of these materials. A "passive" surface is one that exhibits "noble" characteristics or practical immunity to attack by corrosive environments, as compared to the substantial corrosion that occurs on an "active" surface.

Briefly, a passive alloy shows much better corrosion resistance than the electro-motive series positions of the constituent elements would indicate. For example, the position of chromium in the e.m.f. series indicates poor corrosion resistance, yet chromium is the major element contributing to the corrosion-resistant properties of the stainless steels.

Several explanations have been advanced concerning the nature of mechanism of passivity of stainless steels. The most widely accepted theory suggests the formation of an oxide, such as chromium oxide, on the surface of the metal and the protection of the metal by this oxide from corrosion. Another theory assumes that chemically-absorbed oxygen forms a protective layer on the metal surface. Little or no proof has been found, however, to allow definite acceptance to be given to these theories.

Passivation Treatment

Investigations have shown that 18:8 stainless steel becomes passive because of a physically adsorbed gas. At room temperatures specimens of this alloy display passivity upon exposure to air and lose passivity when exposure is reduced.

This process is reversible in that the alloy can be passivated, broken-down, and re-passivated by alternate exposure to air and vacuum.

The ready breakdown of passivity under vacuum at room temperature indicates weak bonds between the gas and the metal which, in turn, indicates physical adsorption. Oxides or absorbed gases would be considerably harder to remove or break down, and this would probably require an elevated temperature.

Several passivation treatments were tried during the preliminary phases of this study. The treatment found most effective, based

on corrosion tests, is the one which is designated as the sulphuric-air treatment. It consists of exposing a specimen of 18:8 to boiling 10 per cent sulphuric acid for 3 minutes, washing thoroughly in water, and then exposing the specimen to air. Similar results are obtained if hydrochloric acid is used. Removal by corrosion of a small amount of metal from the alloy, followed by exposure to air, was found to be an effective passivation treatment several years ago. Incidentally, this situation probably accounts for many of the apparent inconsistencies in the data resulting from corrosion tests on stainless steels and stainless alloy in sulphuric acid and some other media.

Electron Diffraction Tests

Passivated 18:8 surfaces have been investigated by electron diffraction in an attempt to find crystalline oxides. Electron diffraction patterns gave no evidence of their existence, and these experiments are considered as indirect evidence that passivity is due rather to an adsorbed gas. Electron diffraction does show, however, a diffuse and unidentified pattern which may be a hydrous oxide of nickel or chromium. This material may be of assistance in providing a surface that readily adsorbs gas.

Passivation of stainless steel equipment by exposure to warm dilute nitric acid is quite a common practice in industry. Numerous tests using this passivation treatment suggest that this treatment does not passivate stainless steel. It is a fruitless operation and a waste of money as far as passivation benefits are concerned and students of corrosion are rapidly adopting this viewpoint.

The nitric acid treatment may be of some benefit in removing iron particles that may have been embedded in the surface of the metal during rolling or other fabrication operations. This, however, is not a passivation effect and if the metal is pickled after rolling or forming, which is often the procedure, the nitric acid treatment is a superfluous operation.

The usual mill operation of pickling should be considerably more effective than the nitric acid treatment by the fabricator or user, so far as passivation is concerned. Pickling doubtless dissolves some of the metal surface, and the pickling operation is normally followed by washing and exposure to air. In other words, a pickling operation in the steel mill is somewhat similar to the sulphuric acid passivation treatment.

The austenitic stainless steel commonly designated as 18:8 is a relatively soft material in the annealed condition, and it can be hardened or strengthened only by cold working methods. If it were possible, by heat treatment alone, to harden steel, having approximately the corrosion resistance of 18:8, a very desirable situation would develop, particularly in cases where high strength and hardness and/or resistance to wear, galling, or seizing are required.

In addition, the fields of application of this type of material could be greatly expanded because it could be used in shapes and equipment that are not readily amenable to cold working. In general, cold working is applied to only such shapes as wire, sheets, tubing, and strip.

Tensile Strengths

Investigations of heat-hardenable or age-hardening 18:8 type steels was started some few years ago, but it was not until recently that a material of this type became commercially available. The nominal composition of this alloy is as follows: 17 per cent Cr, 7 per cent Ni, 0.7 per cent Ti, 0.2 per cent Al, 0.07 per cent C, 0.5 per cent Si, 0.5 per cent Mn, 0.01 per cent P, and 0.01 per cent S. It could be described as a "starved" 18:8 containing titanium and aluminium with titanium as the principal hardening agent. In the soft or solution annealed state it shows a tensile strength of 120-150,000 lb. per sq. in., an elongation of 8-14 per cent, and a hardness of 235-270 Brinell. The material is precipitation-hardened or age-hardened by holding at 950°F. or a little higher, and then cooling in air. The hardened material shows a tensile of 195-255,000 lb. per sq. in., and elongation of 8-14 per cent, and a Brinell hardness of 370 to 460.

Adaptable Alloy

This alloy can be produced in cast or wrought form. The alloy parts could be rough-turned or even machine-finished before the hardening treatment, since little oxidation occurs at the ageing temperature involved. Stainless electrodes are produced for welding this alloy which is ferritic or magnetic in the age-hardened condition and austenitic or non-magnetic at elevated or annealing temperatures. The material precipitation-hardens because the hardening constituents are soluble in austenite and comparatively insoluble in ferrite.

The hardened stainless alloy is not as resistant as annealed 18:8 to severe corrosion conditions, but for the milder services the two materials can be considered equivalent so far as corrosion is concerned. This situation is fortunate from the corrosion standpoint, when one considers that the new

stainless steel was developed primarily for high strength purposes.

Corrosion tests in sea water, salt spray, various atmospheres, hydrogen sulphide gas, sulphur dioxide gas, and hot milk indicate no essential differences in corrosion resistance between the new stainless and 18:8. The former did not show susceptibility to intergranular attack in a modified Strauss test (boiling solution of copper sulphate and sulphuric acid) although the new alloy in the precipitation-hardened state is considerably inferior to annealed 18:8 in the boiling 65 per cent nitric acid test. The boiling 65 per cent nitric acid test does not, however, indicate the corrosion resistance or applicability of the material for service in other corrosive media, including nitric acid at lower concentrations and/or temperatures.

The effect of age-hardening on the erosion-corrosion resistance of the new stainless steel should be of great interest. It is generally assumed that a hard material should show better performance than a softer material under conditions of erosion-corrosion, provided both materials exhibit about the same corrosion resistance to a given solution under static conditions. This assumption may not hold true in many instances and may be an entirely erroneous assumption, particularly under fairly corrosive conditions.

Acid Tests

Several tests have been made on annealed and hardened stainless alloy in 1 per cent, 5 per cent, and 10 per cent sulphuric acid at 125°F. Practically no difference was found in the 1 per cent solution but in the two stronger acids the rate of attack on the hardened material was much greater. These results should be regarded as preliminary, and additional experiments will have to be made. In all the tests the specimens were exposed to the acids moving at high velocity.

"LION BRAND" METALS AND ALLOYS

MINERALS AND ORES
RUTILE, ILMENITE, ZIRCON,
MONAZITE, MANGANESE, Etc

**BLACKWELL'S
METALLURGICAL WORKS LTD.**

GARSTON, LIVERPOOL, 19

ESTABLISHED 1869

SOUTH AFRICA'S NEW INDUSTRIES

Development of Synthetic Resin Processes

A WIDE range of synthetic resins, emulsions and raw materials to supply the needs of the paint, plywood, paper, electrical, building, leather and allied trades is to be manufactured in South Africa. A site has been acquired by a new company, Poly-Resin Products, Ltd., which expects to begin production within a few months. The latest types of stainless steel plant are being installed, and a trained staff is being brought from Britain to supervise production and to supply technical service to all users of the materials.

* * *

The Rely Paint and Metal Works, Ltd., Cape Town, is now producing a new type of white underwater paint, employing synthetic resins, which is expected to compete successfully with other ships' bottom paints normally used. The paint has been subjected to preliminary tests in local waters and further extensive tests are to be carried out. A new plant is being installed in the Cape Town factory of this company and it is estimated that if the synthetic resins are available an output of about 3000 gal. a day will be possible.

* * *

Although cement production in the Union is being augmented by monthly shipments from overseas, supplies continue to be critically scarce throughout South Africa. All importations into the Union are fixed by Government allocation, which permits a monthly acceptance of 20,000 tons. Building Control officials are understood to have asked the Government for an increased allocation. Shipments are principally from Britain, America and Belgium. Imported cement costs 7s. 9d. for 110 lb., against the home price of 4s. 3d. for 98 lb.

* * *

South Africa may ultimately have more than one plant in operation for the production of synthetic petrol and aviation fuel from coal. It is believed now that African Explosives and Chemical Industries, which employs much overseas capital, may in the future set up a synthetic fuel plant. The production of 60 million gal. of petrol a year is contemplated by the industrial group now planning to set up a synthetic plant at Vanderbijl Park. This plant, however, will not reach the production stage until the end of 1950.

* * *

South African capacity for the manufacture of superphosphates is expected to reach approximately 600,000 tons early next year; the manufacture of nitrogenous fertilisers, is

also to be extended. The industrial group which now produces most of the country's requirements of chemical fertilisers is largely extending its plant at Umbogintweni, near Durban, and at Somerset West, Cape, the increased production of which is likely to be in excess of South African needs and to permit the exportation of substantial tonnages to adjacent countries.

* * *

Because they are cheaper, efficient and much easier to obtain, soya beans are largely replacing meat as a medium for bacteriological research at the South African Institute for Medical Research. Soya beans so closely resemble meat in certain properties that nearly all bacteria will grow on a solution specially prepared from them. The beans are also effective as a medium for propagating specimens taken from a suspect, when ordinary diagnosis is difficult.

* * *

Hydrolised protein from whale-meat and beef, which has been proved of considerable nutritional value, will probably be manufactured on an extensive scale in Natal and exported in large quantities during the coming years to alleviate acute food shortage in some parts of Europe. The entire plant for the process, evolved by Col. Watkins Pitchford in Natal, has been bought from the South African Red Cross Society by Mr. Michael Ostrowiak, a Durban industrialist, for £2500. Hydrolised protein which has been produced includes a wine, malt sandwich spread, biscuits and a powdered extract.

* * *

Research by the laboratory division of the Johannesburg Public Health Department has lately enabled valuable advice to be given to certain small-scale manufacturers, based on studies by the municipal chemists. This is revealed in the annual report of the Johannesburg city engineer for 1947, which records that one of the problems solved was the treatment of scum on the surface of settlement tanks into which industrial waste water was led. This seriously impeded the work of the municipal disposal plant. A report by Mr. J. A. McLachlan, of the laboratory staff, which is contained in the city engineer's report, states that laboratory tests showed that this "blanket" scum, was formed of soluble nitrates discharged during the manufacture of white lead, and a percentage of insoluble lead carbonate. Manufacturers were then advised how these nitrates could be recovered and used to make agricultural fertilisers, by evaporating and crystallising the dissolved salts.

American Chemical Notebook

From Our New York Correspondent

THE third and final production unit of the new plant of the Calco Chemical division of the American Cyanamid Company at Willow Island, West Virginia, has now been completed and is already in operation, the company announced last week. The new unit will produce melamine, derivatives of which are used in many industries, including paint, varnish, plastics, paper and textiles. Other derivatives to be made at the new plant are Melmas, used in the production of durable and lightweight tableware, and Lanaset, for the treatment of woollen fabrics to control shrinkage.

* * *

A move which raised to one level the price of electrolytic nickel in three principal markets (U.S.A., Canada and the U.K.) was announced last week by the International Nickel Company, which stated that the American contract price for electrolytic nickel from the Ontario refinery of the company would be immediately increased from 33½ to 40 cents a lb. in all three markets. Mr. Robert C. Stanley, chairman of the company, said that the increased pre-war demands for metal had placed such a drain on the ore reserves of case-metal producers that they were forced to mine lower grade ore. Increased operational expenses had resulted in higher selling prices.

* * *

The characteristics of Thiokol, the flexible synthetic rubber showing high resistance to gasoline, oil, ink, paint and most chemical solvents, so that it serves equally well in printing rollers and in paint spray equipment or aircraft fuel systems, were described at the two-day meeting in Los Angeles, California, sponsored by the American Chemical Society's Rubber Division and the Los Angeles rubber technicians. It was suggested by Mr. Walter E. Boswell, of the Thiokol Corporation, that the special characteristics exhibited by Thiokol PR-1 are such that it could be advantageously used in most rubber applications where the ultimate in solvent resistance was required. He said that Thiokol ages well because of its ability to withstand the harmful effects of sunlight, air, oxygen and ozone. The new synthetic rubber remains flexible over a wide temperature range, is pliable at -45°F. without a plasticiser or softener, and it does not melt at high temperatures. It is not recommended, however, for long use at temperatures above 212°F.

It was reported by E. I. Du Pont de Nemours & Co., Inc., at the end of June, that 94,244 different investors held stock in the company. This represents an increase of 821 over the number of holders recorded at the close of the first quarter of this year, and an increase of 2706 over the number of holders on June 30, 1947. There were 76,687 holders of common stock and 23,627 holders of preferred stock at the end of the second quarter of 1948, including 6070 holders of more than one kind of stock. More than 43,900 holders were women.

* * *

"What's New for the Laboratory," Number Five, has just been released by Scientific Glass Apparatus Company, Inc., 49 Ackerman Street, Bloomfield, New Jersey. The new twenty-page booklet describes recently introduced new equipment and instruments including electronic temperature control equipment, Todd silent burner, immersion heaters (fused quartz), laboratory mixers, precision ovens, electronic cycle timer, utility ovens, Dewar flasks, etc. Copies of the booklet may be obtained upon written request to the company.

* * *

The Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago, Illinois, has just released Technical Bulletin No. 11, "Alkanesulphonic Acids" describing varied commercial applications of the materials which until now have not been commercially available. The metal salts of the acids, including those of barium and lead, are of interest in the rapid electrodeposition of metals. The acids are solvents for many complex high molecular weight compounds and are effective catalysts for esterification, polymerisation, condensation, alkylation and other organic reactions. These lower alkanesulphonic acids should not be confused with conventional sulphonic acids from petroleum sources as sulphonates.

U.S. Wheat Production.—U.S. farmers are being urged by the Department of Agriculture to aim at a production level of 1100 million bushels (60 lb.) of wheat during 1949. The new target figure represents a decrease of about 8 per cent on this year's crop, but domestic and export demands will still be met.

Technical Publications

THE introduction to Information Bulletin No. 14 (The Aluminium Development Association) "Anodic Oxidation of Aluminium and its Alloys" begins with a brief historical note, then describes the mechanism of the formation of the anodic film, the effect of alloying elements on the current density and appearance of the film, and the special problems connected with anodising of castings. The chromic acid, sulphuric acid and oxalic acid processes are separately described. A special section deals with the dyeing of anodised aluminium, and the suitability of films for dyeing. Elsewhere an account is given of dyeing with inorganic salts, the production of special effects including multicolour effects, direct printing and photographic processes. Copies are obtainable from the Aluminium Development Association, 33 Grosvenor Street, W.1.

* * *

Among a number of useful contributions in *Fuel Efficiency News*, July (Ministry of Fuel and Power), is a note on the Fuel Efficiency Advisory Service, a wartime organisation now established on a permanent basis with regular personnel. These experts have a wide range of knowledge of fuels and their applications. The Service, with a H.Q. at Queen Anne's Chambers, S.W.1, is to maintain close contact with industrial research associations. The steam engine, which the *News* contrasts with the old soldier—"it dies but never fades away"—is described as a potentially heavy user of steam, particularly with advancing age. It is suggested that the regular use of the engine indicator will lead to greater efficiency and offer other important information. Illustrations of "Bad Practice—Good Practice" in furnaces fired by producer gas will have useful applications.

* * *

The newly issued yearbook of the American Bureau of Metal Statistics—the 1947 edition—contains a wide collection of statistics dealing with production consumption, stocks, imports and exports, etc., of copper, lead and zinc. The book also contains the usual data on tin, aluminium, antimony and some of the minor and precious metals, including gold and silver. It contains, for the first time, statistics of copper production, shipments and stocks, reported by the Copper Institute, and consumption, stocks, etc., reported by the U.S. Copper Association. The book is distributed by the ABMS, 33 Rector Street, New York 6, N.Y. (\$3.00 post free).

D

The Dominion Water and Power Bureau, Mines, Forests and Scientific Services Branch, Department of Mines and Resources of Canada, has published volume 96 of the Water Resources Papers dealing with the surface water supply of Canada. This number contains the results of investigations by Dominion Hydrometric Survey during the climatic years October 1, 1942, to September 30, 1944, in the Provinces of New Brunswick and Nova Scotia. It contains 70 pages of stream flow data for rivers and streams within the area and with rainfall records for these two years at a number of places in the Maritime Provinces. (Receiver General of Canada to the Controller of the Dominion Water and Power Bureau, Department of Mines and Resources, Ottawa, Canada, 50 cents.)

* * *

Almost everything a prospective user of the Parker steam engine needs to know—it is said that users may be found almost anywhere from "Chester to Chittagong"—is to be found in a 44-page booklet entitled "The Parker Engine." In addition to photographs of actual installations, there is a useful chapter for buyers, to which is appended blue-prints of single, two, and three-crank compound engines. Copies are available from Ashworth & Parker, Ltd., Bury.

* * *

"Koppers Diamyl Phenol" is the title of a new bulletin, No. C-3-110, just issued by the chemical division of the Koppers Company, Koppers Building, Pittsburgh 19, Pa., which in 24 pages describes the properties, uses, and reactions of diamyl phenol, source of additives for lubricating oils, plasticisers, and chemicals for the rubber industry. Physical and chemical properties of the compound are fully described, and a bibliography of 104 references is included.

* * *

The sealing of porous castings by a vacuum process of impregnation, perfected by the Pulsometer Engineering Co., Ltd., Reading, forms the subject of the firm's June leaflet (No. 0930). The impregnation method has been successfully applied to bronze, gunmetal, steel and cast-iron and the pamphlet contains micro-photographs of bronze castings before and after application of the process.

Personal

AMONG those who received the honorary degree of Doctor of Laws at a graduation ceremony in the University of Glasgow last week was **PROF. ROBERT JACK**, Professor of Physics and Dean of the Faculty of Science at the University of Otago. A graduate of Glasgow University and the University of Göttingen, he received his early training as a teacher in the Queen's University, Belfast.

The award of the George Medal to **MR. HUGH EDMUND WATTS**, chief inspector of explosives at the Home Office since 1945, was announced this week. The award recognises his courage and skill in opening and rendering safe the 22 explosive letters and packets sent to prominent figures in this country since 1945. Mr. Watts, a Fellow of the Royal Institute of Chemistry, has studied explosives since the first World War, joined the Home Office in 1924 and became a second inspector of explosives in 1931.

The first Canadian to be accorded the honour, **MR. T. W. SMITH**, of Canadian Industries, Ltd., Montreal, has been appointed one of the two Jubilee Memorial lecturers of the Society of Chemical Industry for 1948. The distinction which has been conferred on some several outstanding personalities in the field of industrial chemistry, involves the delivery of lectures before at least two of the sections of the international organisation. Mr. Smith, who was recently elected president of the Chemical Institute of Canada, plans to deliver a lecture in the autumn before the Canadian section and later before the U.S.A. section in the United States.

Wills

MR. CHARLES H. LEONARD, the first to extract petrol from petroleum, left £551,780 (duty £294,179).

SIR WILLIAM MURRAY MORRISON, of Bramham Gardens, S.W., late vice-chairman of the British Aluminium Co., Ltd., left £75,199.

SIR HENRY BEYER ROBERTSON, chairman of Brymbo Steel Co., Ltd., Wrexham, and a director of several other companies, left £167,695 (£100,540 net).

MR. JAMES GREENHALGH, principal of Standard Fireworks, Ltd., Huddersfield, who left £37,343 (£35,676 net), bequeathed the residue of his estate or £10,000, to the Bishop of Wakefield's Fund for the churches of the diocese.

Personal

Obituary

DR. WILLIAM CARRICK ANDERSON, formerly senior assistant lecturer in metallurgical chemistry at Glasgow University, has died at his home, Gateside, Blaufield, age 76. He was awarded the degree of D.Sc. at Glasgow University in 1899 for research on the chemistry of coal and was the author of numerous articles on timber and stone preservation and metal corrosion.

PARLIAMENTARY TOPICS

Supply of Drugs.—In reply to a motion by Mr. E. P. Smith, which proposed annulling the Poisons (Amendment) (No. 2) Rules, 1948, Mr. Younger said it had been necessary to take account of the legitimate needs of doctors and patients, and the relaxation of the rules was made necessary because other regulations had been greatly tightened up. When dangerous drugs were supplied in emergencies, it was necessary to rely on the common sense of the pharmacists concerned. The motion was withdrawn.

Drugs and Chemicals.—Mr. Platts-Mills asked the President of the Board of Trade what action he proposed to take on the resolution passed by the annual meeting of the Socialist Medical Association calling upon the Government to set up a working party within the drug, chemical and allied industries. Mr. Belcher: I am not satisfied that a working party of this description would serve any useful purpose.

Coal Tar Plastics

In a recent article dealing with the work of the Chemical Research Laboratory (DSIR) in the plastics field (*THE CHEMICAL AGE*, July 3) mention was made of the difficulty of avoiding duplication of research work. In this connection it was stated that while a patent application covering polymers and copolymers of acenaphthylene was in course of preparation, a prior specification (British Patent Application No. 24441/45) which covered the same ground became open to inspection at the Patent Office.

It is now learned from the DSIR that this patent which anticipated the CRL's discovery, was based upon American research and there was, therefore, no duplication of British efforts.

Descriptive illustrated matter just issued by Brookhirst Switchgear, Ltd., Chester, affords all essential technical and commercial information about the 759 block push button control and the 753 snap action switch, both of which can be employed on either single or duplicated circuits.

Home News Items

Token Imports from Norway.—The Board of Trade announces that Norway has now been added to the list of countries participating in the Token Import Scheme. Countries already participating are Australia, Belgium, Canada, Denmark, Finland, France, Holland, India, Italy, Luxembourg, Pakistan, Sweden, Switzerland, and the U.S.A.

Mr. Bevan's Praise for Pharmacists.—The Minister of Health, Mr. Aneurin Bevan, paid a tribute to the Pharmaceutical Society when he was the Council's guest at their monthly dinner, on July 27. They had always got on well together, he said, and discussions with the pharmaceutical profession on the National Health Service had been more more fruitful than with any other branch of the medical world.

Mechanical Handling Exhibition.—Attendance at the Mechanical Handling Exhibition and Convention at Olympia, which closed on July 21, totalled 4000 a day. Large contracts are stated to have been placed by the GPO and the Finnish Post Office and an initial order for contractors' plant valued at £50,000 was received from the Argentine. Many items of equipment were also sold for Colonial development schemes.

Calcium Carbide Prices Raised.—The Director of Sundry Materials, Board of Trade, 10 Old Jewry, London, E.C.2, announces that the price of calcium carbide distributed through the Carbide Distributing Agency, Ltd., Carbide House, 55 Gordon Square, London, W.C.1, has been increased by £1 15s. per ton from August 1. Prices will then be: 4 tons and over £30 per ton; 4 cwt. and over £31 15s.; under 4 cwt. £32 15s.

Another Scottish Industries Fair.—Preliminary answers to questionnaires distributed through Chambers of Commerce in Scotland show that 340 firms would consider taking space in the proposed Scottish Industries Fair next year, and 207 of those firms are in favour of Glasgow as a centre for the exhibition. The Scottish Council (Development and Industry) estimated such an exhibition could be run in the Kelvin Hall, Glasgow, in autumn next year for three weeks at a total cost of about £40,000 and that a charge of 10s. to 12s. 6d. per square foot of space, exclusive of the cost of stands, would clear expenses.

Undergraduates in Industry.—Fifty-six university students are working in Dunlop factories during the long vacation. They come from 19 universities in the United Kingdom, Belgium, Denmark, Finland, France and Sweden. Most of them are doing temporary staff jobs, but a few who want factory experience are working as operatives. They are paid the rate for the job.

Science and Agriculture.—Sir John Boyd Orr accepted an invitation to address the Parliamentary and Scientific Food Committee last week on "Science and Increased Food Production in Great Britain and the Colonial Empire". Science and agricultural production was one of the subjects scheduled for discussion by the committee, which also dealt with paper supply for scientific books and journals and a draft memorandum prepared by Mr. F. J. Erroll, M.P., on the use of steel.

Scottish Lime and Cement Production.—In an attempt to increase the domestic production of lime, a committee appointed by the Scottish Council (Development and Industry) is investigating the commercial utilisation of substantial limestone deposits in Midlothian, Banffshire and the West Highlands. Efforts are also being made to develop the country's cement industry, with a view to self-sufficiency.

Business as Usual.—Although proofing and dyeing machinery was lost in a fire which broke out early on July 19, at their Cobden Street works in Pendleton, Salford, J. Mandleberg and Co., Ltd., are to work night shifts. Mr. C. W. B. Bancroft, managing director, described the severe damage to the machinery and building as "inconvenient, but we have other proofing machines, and by working shifts we can maintain production."

Sale of War Factory Opposed.—Strong public opposition was expressed at a Morecambe public inquiry on July 28 when the Ministry of Supply sought approval for the sale of a £10 million war factory at Middleton, near Morecambe, to I.C.I., Ltd., and Shell Mex. The sale was opposed by near-by residents who anticipated that noxious smells, smoke and dirt would be caused. Morecambe Corporation, Lancaster Corporation, Lancaster R.D.C. and a number of individuals opposed the application.

Overseas News Items

Argentine to Use Shale Oil.—Because of shortage of fuels in Argentina, petroleum in particular, it is planned to exploit oil shale deposits in the Mendoza province where very large reserves exist.

Rubber Estates Destroyed.—Military sources in Java report that the estates of the Anglo-Java Rubber Company have been totally destroyed. The estates consist of 8940 acres, of which 1281 are planted with coffee and the balance with rubber.

U.S. Aid for China.—A total of \$72,795,000 is available in economic recovery funds for China during the July-September quarter, the Economic Co-operation Administration has announced. The funds will be used for the purchase of foodstuffs, capital equipment, petroleum, fertilisers and cotton.

International Ceramic Congress.—The 1948 International Ceramic Congress will be held from September 12 to September 17 in Maastricht and Scheveningen, Holland. The inaugural session is to take place in Maastricht, the final session in Scheveningen.

French African Phosphate.—The monthly average figure for French North Africa's phosphate production rose from 406,362 tons in 1946 to 451,268 tons last year. This compares with 342,120 tons in 1938. The monthly export averages have risen correspondingly.

Solid Motor Fuel.—A French expert is reported to have developed a solid motor fuel which contains water glass, alginic acid, casein, methyl cellulose, together representing 3 per cent of the total. The new product is claimed to have great advantages as regards transport and storage.

French Iron and Steel Research.—The Institut de Recherches Siderurgiques is to be established in Saint Germain-en-Laye near Paris. The functions of this Institute, which is expected to have a staff of about 100, are described as similar to those of the British Iron and Steel Research Association.

Oil Company Officials Arrested.—Two British officials of the Unireca Oil Company, Mr. E. Boden, general manager, and Mr. R. L. Wilson, refinery manager, were arrested in Rumania last week. Mr. Wilson was released after protests by the British Consul, but his colleague is still held. No charges have then been preferred.

French Fertilisers for Eire.—According to a recent trade agreement between France and Eire, the latter is to receive some 130,000 tons of chemical fertiliser and 8000 tons of cement.

"Science Serving Death."—Members of the French Scientific Workers' Association have passed a resolution calling for "increased efforts to prevent science serving death" and declaring that the responsibility for the use made of his work rests solely with the scientist.

U.S. Metal Congress.—The 30th annual National Metal Congress and Exposition will be held in Philadelphia for five days beginning Monday, October 25. Meeting simultaneously with the American Society for Metals will be the American Welding Society, the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers and the Society for Non-Destructive Testing (formerly the American Industrial Radium and X-Ray Society).

France-Netherlands Chemical Exchange.—The recently concluded one-year trade agreement between France and the Netherlands provides for the export of the following French chemicals, metals, etc.: phosphates 400,000 tons, iron-ores 400,000 tons, magnesium chloride 600 tons, dyes 300 tons, sera and pharmaceutical products to the value of 100 million francs, textile and leather auxiliary products 10 million francs and various chemicals 100 million francs. Holland is to send a number of chemicals, chiefly organic products.

U.S. Interests in Columbia and Chile.—Agreement has been reached between the Chilean Government and the Chile Exploration Company, a subsidiary of the Anaconda Copper Mining Company, U.S.A., regarding the installation of a new plant at Chuquicamata for the production of sulphide ores. It is stated that the new plant will cost \$6 million, approximately one-half of which will be expended in the first four years. In addition, a Columbian Government delegation is at present visiting the U.S.A. in connection with the exploitation of iron-ore deposits at Paz del Rio in the Department of Boyacá.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

METAL CHEMICAL FINISHES (LIP-HOOK) Ltd. (M., 7/8/48).—July 1, £250 deb., to Nujoy Products Ltd., general charge. *Nil. May 7, 1948.

KUALA KUBU RUBBER ESTATE, LTD. London, E.C. (M., 7/8/48).—June 25, \$58,000 (Straits dollars) mort., to Industrial Rehabilitation Finance Board, Kuala Lumpur; charged on property known as Kuala Kubu Estate 3rd Mile Batang Kali, Ulu Yam Road, Selangor. *Nil. Dec. 9, 1947.

Satisfactions

SOLENT PORTLAND CEMENT CO., LTD. Herne Bay (M.S., 7/8/48).—Satisfactions June 29, of charge registered Jan. 22, and of mortgage registered Feb. 28, 1940.

S. WEST, LTD. Leicester, manufacturing chemists. (M.S., 7/8/48).—Satisfaction July 1, or deb. registered June 24, 1947, to the extent of £100.

Company News

The nominal capital of **H. Gelpke, Ltd.**, 1 Leadenhall Street, London, E.C.3, has been increased beyond the registered capital of £10,000 by £5000 in £1 shares.

Dufay-Chromex, Ltd., have decided to postpone the decision regarding payment of a dividend on the £180,000 6 per cent cumulative first preference shares which were payable on August 1, until the audited accounts for the group for year to September 30, 1948, are available. For the year 1946-47, no dividend was paid on either the £100,000 6 per cent redeemable non-cumulative second preference shares or the £718,622 ordinary, but 10 per cent, less tax, was paid on the ordinary for each of the two previous years.

New Companies Registered

The X-ray research and production interests of **Metropolitan-Vickers Electrical Company** are associated with the **Victor**

X-ray Corporation and **Newton & Wright** in a new company to be named **Newton Victor**. It will be devoted wholly to the design, manufacture, distribution and servicing of X-ray and electro-medical equipment.

Eliminax, Ltd. (457,320).—Private company. Registered July 17. Capital £5000. Manufacturers of degreasants, dispersants, solvents and compositions for the removal of oil, grease, rust, carbon and all corrosives from metal, etc. Directors: Cecil B. Jones and May Oldham. Regd. office: 84, 85 and 86 Chancery Lane, W.C.2.

Insecta Laboratories, Ltd. (457,301).—Private company. Registered July 16. Capital £1000. Industrial, domestic and agricultural pest controllers, chemists, etc. Directors: Miles D. Price, Geo. S. Monks and Manon Shaw. Regd. office: 159 Victoria Street, S.W.1.

Charman Commercial Services, Ltd. (457,181).—Private company. Registered June 30. Capital £100. Dealers in soaps, oleaginous compounds, adhesives, synthetic products, etc. Directors are: Ronald E. G. Charman and Vida F. B. Charman, both of 10 Round Hill Crescent, Brighton.

Scottish Diatomite, Ltd.—Private company. Capital £25,000 in £1 shares. To develop and exploit diatomite deposits on the island of Skye. Subscribers: Major-General Harry MacDonald, Redcliffe, Portree, Skye; Robert Parry, Hugh B. Millar, and W. R. M. Murdoch (solicitor), all of Glasgow.

Synthelene, Ltd. (457,143).—Private company. Registered June 30. Capital £100. Objects: To carry on the business of manufacturers of and dealers in lacquers, polishes, varnishes, paints, etc. Solicitors: R. J. Twyford & Co., Salisbury House, E.C.2. Reg. office: 529 Salisbury House, London Wall, E.C.3.

Chemical and Allied Stocks and Shares

HOLIDAY influences have held stock market business in check, and earlier in the week, buyers were very cautious pending fresh news of the Berlin situation. Exceptionally, however, British Funds have been in demand, particularly the nationalisation stocks, gilt-edged responding readily to moderate "safety-first" buying and a certain amount of switching from short-dated into long-dated stocks.

Chemical and allied shares moved narrowly, Monsanto Chemicals 5s. ordinary changing hands around 58s. 1½d., and Laporte Chemicals 5s. units around 20s.

Burt Boulton & Haywood marked 27., Albright & Wilson were 28s., Fisons 57s. 6d., British Drug Houses 5s. ordinary 8s. 6d. and Greff Chemicals Holdings marked 14s. 3d. British Glues 4s. ordinary were around 19s. following publication on the full results and now yield $5\frac{1}{2}$ per cent on the basis of last year's 25 per cent dividend. In his annual statement the chairman mentions that he looks forward to substantial and profitable expansion of the company's interests in Canada.

Turner & Newall were 74s. 5d. with which there is a yield of 4 per cent, the strong balance-sheet position being generally recognised and also the possibility of higher dividends when the voluntary dividend limitation plan is finally removed. United Molasses were 47s. 6d. and yield rather more than $4\frac{1}{2}$ per cent, while Imperial Chemical have changed hands actively around 46s., and now also yield approximately $4\frac{1}{2}$ per cent, a not unattractive return for a leading industrial, particularly as the directors have indicated that they anticipate being able to maintain the 10 per cent dividend on the larger capital. British Oxygen strengthened to 96s. 10 $\frac{1}{2}$ d. and the 4s. units of the Distillers Co. were 26s. 9d. at which the yield is slightly over 4 per cent on last year's 27 $\frac{1}{2}$ per cent dividend. Steadiness was shown in Borax Consolidated deferred at 57s. 6d. while British Aluminium at 46s. 9d. have been well maintained, but Dunlop Rubber have eased to 70s. on the other hand, Triplex Glass 10s. ordinary strengthened to 24s. and in other directions, the yield of approximately $4\frac{1}{2}$ per cent drew attention to Ilford 5s. ordinary, which improved to 25s. 3d. Paint shares attracted, it being pointed out that in most cases dividend payments are moderate in relation to earnings, and that there would have to be a heavy fall in profits in future to necessitate lower dividends. International Paint have improved further to £7 $\frac{3}{4}$ on the proposal to "split" the £1 units into five of 4s. each. Indestructible Paint and Lewis Berger have already subdivided their shares, a course which makes for a wider and more active market in them.

There was only moderate business in iron and steels, the good yields failing to attract buyers, although there is every prospect of dividends being maintained with steel production at its present record level, and moreover, it is generally agreed that in any case, nationalisation could not be effected until 1950. United Steel at 27s. 6d. yield over $5\frac{1}{2}$ per cent, the yield on Colvilles at 32s. 9d. is $4\frac{1}{2}$ per cent, while Richard Thomas & Baldwins 6s. 8d. units at 13s. 7 $\frac{1}{2}$ d. return 7 $\frac{1}{2}$ per cent.

Boots Drug 5s. ordinary were 49s., Beechams deferred 19s., Timothy Whites

34s. 4 $\frac{1}{2}$ d. and Sangers 29s. 6d. in other directions, Lever & Unilever at 48s. 6d. have remained firm on further consideration of the big increase in the past year's profits. Oil shares were inclined to lose ground with Anglo-Iranian only £7 $\frac{1}{4}$, Shell 75s., and Trinidad Leaseholds 30s.

British Chemical Prices

Market Reports

WHILE conditions generally have been quieter, due to the shorter week and to the holiday season in the main industrial centres, the contraction in new business has not been marked and to some extent has been offset by the continual flow of overseas inquiries. There is no lack of interest in the soda products section and there are ready buyers for any available supplies and this position also applies to the potash chemicals. Owing to the reduction in the controlled price of linseed oil the price of ground white lead has been reduced by £1 10s. per ton. In order to ensure adequate supplies to industries producing goods for export the Board of Trade has made an order, operative from August 4, which places dyestuffs and certain materials used in the manufacture of dyestuffs on the list of goods requiring an export licence. It is understood that this is a precautionary measure to protect the home producing industries and it is hoped that an improvement in output of British dyestuffs will make the order of temporary duration. The position of the coal-tar products remains unchanged and, apart from seasonal influences, the demand continues satisfactory.

MANCHESTER.—This has been one of the quietest trading weeks of the year on the Manchester chemical market. The flow of delivery specifications of textile and other industrial chemicals has been of small scale, and new business in the alkali and other products on home trade account has been on a similar level. The same may be said of much of the overseas inquiry. This interruption is due almost entirely to the holidays and is likely to be of short duration. The demand for fertilisers is at the seasonal low level but there has been moderate movement of tar products.

GLASGOW.—Business has again been quiet in the Scottish chemical market during the past week, due to the continuation of the trades holidays. The supply position of Glauber salts has deteriorated because of the difficulty of crystallisation in hot weather. In the export market conditions have been very active and a number of good orders have been booked. Prices are showing signs of becoming stabilised.

COMPANY MEETING

The Beecham Group

Larger Net Surplus

THE 20th annual general meeting of the Beecham Group, Ltd., was held on July 28 in London, Sir J. Stanley Holmes, M.P., chairman and managing director, presiding.

The following is an extract from his statement circulated with the report and accounts:—

The net result of the group's trading for the year ended March 31, 1948, is a net surplus of £751,511 available for dividend on the deferred shares and for reserves, as compared with £502,659 in the previous year. It is proposed to declare a final dividend of 4 per cent, making 40 per cent for the year, the same as last year. The trading profits and sundry revenue earned by the 118 companies and branches of the group amount to £2,370,181 compared with £2,688,522 in the previous year.

Although home sales showed an increase of nearly 18 per cent, the home trading profits have shown a decrease of £208,088, due to the steeply rising costs of raw materials, containers, consumable stores and wages, without any compensating increases in the selling prices of the great majority of our products, except those arising from increased rates of purchase tax.

Our export trade has again shown satisfactory results, in spite of increasing costs.

The total charge for United Kingdom taxation amounted to £1,157,366 compared with £1,565,114.

Our food sales have increased in total by over 25 per cent, while the sales of food-stuffs manufactured and canned by our own factories have increased by 65 per cent, compared with last year. The food side of the group's business, which commenced three years ago with the purchase of C. & E. Morton, Ltd., continues to expand rapidly and has already made, and is likely progressively to make, a not inconsiderable contribution to the group's future prosperity.

During the past year personal contacts have been made with our people overseas. The conferences which we have been able to hold on the spot with our overseas managers have enabled us to obtain a clear picture of local conditions and difficulties and should result in increased trade and profits in the future. The recently formed sales companies in India and Malaya have traded successfully since their inception.

It is difficult to make prophecies with regard to the future, but we have so continually broadened the basis of our business and our interests all over the world are so far-flung that we can face the future with confidence.—The report was adopted.

New Copal Plant

Progressive Engineering Practice at Erinoid

THE development of the manufacture of Erinite resins is marked by the recently completed installation of the most modern copal gum running and esterifying plant in the country. Two stainless steel kettles, each of 1 ton operating capacity, have been installed by the Aluminium Plant and Vessel Company at the Stroud works of Erinoid, Ltd. The pots are heated by specially designed oil heaters, which cause a circulation of hot gases around the well-lagged pots and provide a most effective heating system.

Both pots are filled with completely modern stirring gear and CO₂ circulating arrangements. The finished batch is discharged into aluminium lined trays in an adjoining building, in which an atmosphere of CO₂ is maintained. All temperatures are thermostatically controlled and during the trial period it has been shown that the plant produces a remarkably high standard of copal resin.

All products are distributed by A. Boake, Roberts & Co., Ltd., which is associated with Erinoid in the production of resins and ester gums.

GOOD LIMESTONE PROSPECTS

SUPPLIES of limestone during the coming twelve months are stated to be sufficient to cover all requirements. This is the effect of an assurance given to the Government by the Limestone Federation.

Earlier in the year, the federation drew the Government's attention to the possibility of heavily reduced production in view of the loss of labour from limestone quarries during the past few years. This situation, the federation had asserted, was likely to be adversely affected by the withdrawal of German PoW labour, by which many of the important centres of production had been keeping up the necessary output of lime and limestone to steel works and other industries. There has since been a marked improvement in the provision of fuel and labour.

For Indian Readers.—Wolters Balances, Ltd., 365-371 Whippendell Road, Watford, Herts, which received an air mail communication on June 20 from certain chemical apparatus distributors in South India, would be grateful if that firm would communicate again by air mail.

Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patent Office, Southampton Buildings, London, W.C.2, at 1s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Manufacturing sulphurous anhydride, alumina and cements starting from sulphate of calcium and materials containing alumina and silica.—J. C. Seailles. Nov 22, 1939. 602,724.

Production of itaconic acid.—C. Pfizer & Co., Inc. Nov. 25, 1942. 602,866.

Aluminothermic and like exothermic processes.—E. Lux. Oct. 23, 1944. 602,731.

Exothermic process.—E. Lux. Oct. 23, 1944. 602,732.

Azo dyestuffs.—Manufactures de Produits Chimiques du Nord Etablissements Kuhlmann. Dec. 31, 1941. 602,878.

Processes and compositions for the electrode-position of indium alone or with other metals.—Indium Corporation of America. April 19, 1944. 602,879.

Process for the hydrogenation of aromatic nitro compounds.—Standard Oil Development Co., and J. C. Arnold. May 25, 1945. 602,880.

Manufacture of aqueous emulsions for insecticidal purposes.—J. R. Geigy A.G. June 2, 1944. 602,747.

Processes for the sulphonation of heterocyclic compounds.—Pyridium Corporation. July 7, 1944. 602,882.

Manufacture of copper phosphide.—Metallo-Chimique, Soc. Anon. May 23, 1941. 602,814.

Cyanuric chloride.—American Cyanamid Co. Jan. 16, 1945. 602,816.

Plant and presses therefor for the extrusion of lead and lead alloys.—British Insulated Callender's Cables, Ltd., and G. T. W. Grieve. Aug. 24, 1945. 602,894.

Manufacture of aryl and alkyl substituted cysteines.—Therapeutic Research Corporations of Great Britain, Ltd., I. M. Heilbron, and A. H. Cook. Sept. 6, 1945. 602,755.

Manufacture of aromatic acyl-sulphonamides.—R. M. Hughes. (J. R. Geigy A.G.) Oct. 24, 1945. 602,934.

Manufacture of heptan-3,4-dione and ethyl propyl acrylic acid.—Distillers Co., Ltd., B. Duval, A. Elce, and K. H. W. Tuerck. Oct. 26, 1945. 602,832.

Saccharification of cellulosic materials.—Usines de Melle. Nov. 10, 1944. 602,833.

Manufacture and production of porous plastic masses from polymerised vinyl compounds.—I.C.I., Ltd., L. J. Cardy, G. T. Gammon, and W. Walker. Nov. 8, 1945. 602,665.

Production of aqueous solutions of polyvinyl acetate derivatives.—I.C.I., Ltd., and R. R. Lyne. Nov. 14, 1945. 602,974.

Gas turbines.—A. V. Gilbert. Nov. 9, 1945. 602,706.

Condensation products of the anthraquinone series.—I.C.I., Ltd., F. Irving, and A. Livingston. Nov. 14, 1945. 602,975.

Compositions adapted for water-repellency treatment of textile fibre.—I.C.I., Ltd. Nov. 15, 1944. 602,976.

Production of catalytically cracked gasoline.—Shell Development Co. Jan 8, 1945. 602,780.

Method of removing manganese from calcium.—Dominion Magnesium, Ltd. Aug. 17, 1945. 602,910.

Process for polymerising isobutene with other polymerisable substances.—N. V. de Bataafsche Petroleum Maatschappij. April 10, 1943. 602,851.

Overlay metals of aluminium or aluminium base alloy bonded to an iron group metal, or metal base alloy.—Mailory Metallurgical Products, Ltd. Oct. 7, 1944. 602,857.

Oil and like seals.—R. Trist & Co., Ltd., and L. Bomyer. June 4, 1946. 602,792.

Methods of preparing zein solutions directly from gluten.—Time, Inc. Nov. 30, 1942. 604,745.

Softening or plasticising regenerated cellulose pellicle.—G. F. Rayner (Sylvania Industrial Corporation). May 31, 1944. 604,750.

Production of coated sheet material.—Imperial Chemical Industries, Ltd. (E. I. du Pont de Nemours and Co.). December 1, 1944. 604,512.

Manufacture of anhydrous aliphatic carboxylic acids from aqueous solutions thereof.—Usines de Melle. Jan. 13, 1943. 604,760.

Substituted diamines.—Soc. Des Usines Chimiques Rhone-Poulenc. May 24, 1941. (Cognate Application 8033/45.) (Sample furnished.) 604,675.

Method of manufacture of materials required in the electrometallurgy of aluminium.—Compagnie de Produits Chimiques et Electrometallurgiques Alais, Froges & Camargue. April 21, 1942. 604,677.

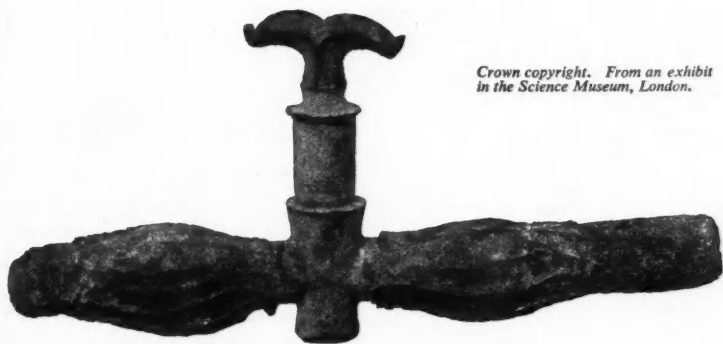
Preparation of substituted ethylene diamines.—Soc. des Usines Chimiques Rhone-Poulenc. Jan. 14, 1944. (Addition to 604,675.) 604,679.

Preparation of substituted diamines.—Soc. des Usines Chimiques Rhone-Poulenc. Aug. 19, 1943. 604,680.

Synthetic resin and process of making same.—T. R. McElhinney. Aug. 9, 1945. 604,599.

Alicyclohexyloxybenzthiazole (and selenazole) carbocyanine dyestuffs and a process of preparing the same.—General Aniline & Film Corporation. Aug. 16, 1944. 604,600.

Simple and Efficient in 1539...



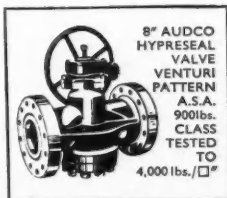
Crown copyright. From an exhibit in the Science Museum, London.

Bronze riveted plug stop-cock on $\frac{3}{4}$ inch (cast round) lead service main, A.D. 1539, Hampton Court Palace.

This stop-cock was installed at Hampton Court Palace *circa* 1539, and remained in service until 1876, when more modern fittings were inserted.

Into the conical body of the cock fits a similarly coned hollow plug, bored on opposite sides with round ways, giving a clear passage to the water. The plug protrudes from the body both at the top and at the bottom, where the edges of the plug are lightly riveted over to retain it in its working position.

The principle on which this ancient valve was constructed led, after four centuries of progress, to the invention and development of the Lubricated Plug Valve. In modern industry Audco Valves lead the world in the control of fluid, as doubtless this old plug-cock did in its day.



MODERN industry needs AUDCO efficiency

AUDLEY ENGINEERING CO. LTD., Newport, Shropshire

Phone : Newport, Shropshire, 3245

Trinuclear cyanine dyes.—General Aniline & Film Corporation. Aug. 16, 1944. 604,687.

Emulsifiable hydrocarbon oils and emulsions thereof.—Shell Development Co. Oct. 7, 1944. 604,603.

Process for discharging cupriferosus dyeings of direct azo-dyestuffs.—Ciba, Ltd. Oct. 31, 1944. (Cognate Application 26914/45.) 604,690.

Production of sulphonamides.—Soc. des Usines Chimiques Rhone-Poulenc. Nov. 24, 1944. (Samples furnished.) 604,693.

Process for polymerising unsaturated organic compounds.—Shell Development Co. Jan. 9, 1945. 604,544.

Method for the manufacture of hollow bodies in synthetic resin material.—M. J. Maillard. Sept. 3, 1941. 604,556.

Purification of penicillin salts.—Glaxo Laboratories, Ltd., A. E. Bide, W. Graham, E. L. Smith, and P. A. Wilkinson. Nov. 27, 1945. (Cognate Application 4837/46.) 604,563.

Production of polyhaloacyl halides.—Imperial Chemical Industries, Ltd. Nov. 28, 1944. 604,579.

Polymerisation processes.—E. I. du Pont de Nemours & Co. Nov. 29, 1944. 604,580.

Modified synthetic polymeric materials.—E. I. du Pont de Nemours & Co. Nov. 30, 1945. 604,708.

Process and apparatus for the absorption of gas in a liquid.—E. I. du Pont de Nemours & Co., C. V. Herrmann, and L. A. Myers. Nov. 30, 1945. 604,709.

Micrometer measuring instruments.—Challand, Ltd., and S. L. Smith. Nov. 30, 1945. 604,714.

Oxyacetylene installation for welding, cutting or the like.—Volcan, Soc. Anon. July 11, 1945. 604,650.

Aluminium base alloy.—T. F. Bradbury. Dec. 5, 1945. 604,813.

Stabilisation of chlorinated paraffin wax.—Imperial Chemical Industries, Ltd., and P. A. Hawkins. Dec. 5, 1945. 604,830.

CHEMICAL LEADWORK

TANKS — VATS — COILS — PIPEWORK

W. G. JENKINSON, Ltd. Telephone 22473
154-160, ARUNDEL STREET, SHEFFIELD

Specialists in
Carboys, Demijohns, Winchester
JOHN KILNER & SONS (1927) LTD.
Tel. WAKEFIELD 2042 Established 1867



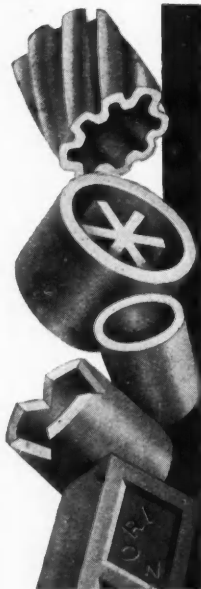
PACKINGS FOR TOWERS

Replacements are less frequently required when towers are packed with

"NORI" ACID-RESISTING WARE

You are invited to investigate the exceptional physical properties of this material, which is now widely used in the leading chemical plants. Literature giving technical data on request. Please send your enquiries for all plant components in acid ware.

ACCRINGTON BRICK & TILE CO.,
ACCRINGTON Tel.: 2684 Accrington



THEY GIVE SERVICE

5" TO 14"
DIAMETER



F. ROBINSON
& CO., LTD.
SOUTHCOATES LANE
HULL.

PHONE
31818-7.

CLASSIFIED ADVERTISEMENTS

EDUCATIONAL

Great Possibilities for QUALIFIED CHEMICAL ENGINEERS

VAST and far-reaching developments in the range of peacetime productions and markets of the Chemical Industry mean that the profession of Chemical Engineering will be of great importance in the future and one which will offer the ambitious man a career of outstanding interest and high status. The T.I.G.B. offers a first-class training to candidates for the Chemical Engineering profession.

Enrol with the T.I.G.B. for the A.M.I.Chem.E. Examinations in which home-study students of the T.I.G.B. have gained a record total of passes including—

FOUR "MACNAB" PASSES and THREE FIRST PLACES

Write to-day for the "Engineers' Guide to Success"—free—containing the world's widest choice of Engineering courses—over 200—the Department of Chemical Technology, including Chemical Engineering Processes, Plant Construction, Works Design and Operation, and Organisation and Management—and which alone gives the Regulations for A.M.I.Chem.E., A.M.I.Mech.E. A.M.I.E.E., C. & G., B.Sc., etc.

THE TECHNOLOGICAL INSTITUTE OF GREAT BRITAIN

219, Temple Bar House, London, E.C.4

SITUATIONS VACANT

None of the vacancies in these columns relates to a man between the ages of 18 and 50 inclusive, or a woman between the ages of 18 and 40 inclusive, unless he or she is exempted from the provisions of the Control of Engagement Order, or the vacancy is for employment exempted from the provisions of that order.

CHEMICAL Export Merchants require services of competent, energetic and trustworthy gentleman with general knowledge of chemicals and allied products to take charge of responsible, permanent and progressive position, used to work on own initiative. Write in confidence with full particulars to Box No. 2686, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

J. & P. require a qualified chemist or physicist to take charge of the chemical and physical laboratory associated with their Paper Cable Factory. Applicants should have a thorough knowledge of the materials used in construction of all types of paper insulated cables and cable accessories and special consideration will be given to those possessing actual experience in cable manufacture. In addition to the organisation and supervision of the work of the laboratory the requirements include ability to undertake investigations in connection with problems arising in processing and use of cables, and in long term development work.

A salary commensurate with qualifications and experience will be paid and applicants should be about 30 to 35 years of age.

Replies, giving full details of training and experience should be addressed to the **EMPLOYMENT AND WELFARE MANAGER, Johnson & Phillips, Ltd., Charlton, London, S.E.7.**, and will be treated in strict confidence.

SITUATION VACANT

SENIOR DRAUGHTSMAN required in London by a firm of prominent chemical and general engineers. Applicants must be fully experienced and, preferably, have some knowledge of chemical plant. Apply, stating age, previous experience, and salary required, to Box No. 2685, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

SALE BY AUCTION

By Order of the Minister of Supply Without Reserve



**M.O.S. DEPOT No. 151
WING AIRFIELD, BUCKS**

8½ miles from Aylesbury and 4½ from Leighton Buzzard
THIRD IMPORTANT SALE

MISCELLANEOUS EQUIPMENT AND STORES including:

OIL IMMERSION TRANSFORMERS, BATTERY CHARGERS, PHILLIPS SPOT WELDER, COSSOR WELDING TABLES, Accumulators, Electric Motors, Switches, Lamps, Starters and Fans, Magnetos, Charging Panels; VIBRATOR AND RECTIFIER POWER SUPPLIES, VALVE GRID WINDING MACHINES, Rotary Transformers, Control Units and Connector Cables, Volt and Ammeters, Field Telephone Sets, Microphones and Headphones, Daylight Signalling Lamps; COLES AND OTHER CRANES, COMPRESSORS, Solder, Small Engine Parts, Furnaces; OPERATING TABLES, HOSPITAL CABINETS, Trolleys and Stands, Bandages; MESS TINS, R.A.F. BOOTS AND SHOES, OILED SHEETS, Camouflage Netting, Tanks, Boxes, Buckets, Duplicator Rollers, Swivel Chairs, Shell Boxes, Steel Helmets and numerous other lots which

W. BROWN & CO.

have received instructions to sell by auction, at Wing Airfield, on

THURSDAY and FRIDAY, AUGUST 26th and 27th,

Commencing at 10.30 a.m. each day

View Days: Monday, Tuesday and Wednesday, August 23rd, 24th and 25th, from 9.30 a.m. to 3.30 p.m. each day, and on Sale Days from 9 to 10 a.m.

Catalogues: 6d. each (P.O.'s only) admitting one person on Sale Days and two on View Days, may be obtained of the Auctioneers:

MESSRS. W. BROWN & CO.
(Dept. M.O.S.)

24, Market Square, Aylesbury. (Tel. 38)

Also at:

2, Church Street, Aylesbury. 41, High Street, Tring.
122, High Street, Berkhamsted.
78, Marlows, Hemel Hempstead.

AUCTIONEERS, VALUERS, Etc.

EDWARD RUSHTON, SON AND KENYON
(Established 1855).

**Auctioneers' Valuers and Fire Loss Assessors of
CHEMICAL WORKS, PLANT AND
MACHINERY**

York House, 12 York Street, Manchester.

Telephone 1987 (2 lines) Central, Manchester.

FOR SALE

GEORGE 600 COHEN'S

CHEMICAL PLANT FOR SALE

- ONE**—Twin roll **DRIER** by N. V. Goudche of Gouda, Holland. Steam-heated rolls 3 ft. 11 in. long by 1 ft. 10 in. diam. Driven through enclosed gears by 6 h.p. motor, 440/3/50. Drier complete with fume hood, two discharge worm conveyors. Capacity, 60 galls. per hour.
- Four**—Cast iron plate and frame **FILTER PRESSES**, cake 36 in. square, frame 4 in. thick. 23 plates 1½ in. thick. 3-in. flanged bottom inlet, oval section bottom drains 1 in. by ½ in., suitable for clamp bolts. Manual centre screw closing gear.
- One**—Double tube **ROTARY DRIER** by Vickers Armstrong, 52 ft. long by 7 ft. 6 in. diam. (Internal tube approx. 3 ft. 6 in. diam.), outer shell ½ in. riveted steel plate with internally bolted flights. Drive by 50 h.p. Brook totally enclosed slip-ring motor, 440/3/50, through David Brown Radicon reduction gearbox, 50 h.p. Complete with brick furnace approx. 16 ft. long by 10 ft. by 10 ft., and Babcock and Wilcox chain grate stoker, 54 in.
- Three**—Unused aluminium **DRYING CABINETS** by J. Glover, each cabinet has 4-heat insulated compartments equipped with individual doors, four 2 ft. 2½ in. by 1 ft. 9 in. tubular aluminium shelves in each compartment. 9 in. square ducting fitted to top and bottom of each cabinet for inlet and outlet of hot air.
- One**—**PREHEATER** by Waugh. 8 kW. for 230 volts supply. Arranged with 2-in. connections and two arms for wall support. Complete with separate thermostat range 100/250 deg. F.
- One**—Chambers 12-compartment steam **DRYING OVEN**, 7 ft. high by 6 ft. wide by 3 ft. 6 in. deep overall. Each compartment 28 in. wide, fitted with drop door and two racks to take trays 28 in. wide by 35 in. by ½ in. deep, ½-in. steam coil in each compartment connected to 1-in. pipe each side of oven.
- Several**—2000-litre **EARTHENWARE VESSELS**, approx 5 ft. 6 in. by 4 ft. diam. by approx. 1½/1½ in. thick, and 3000-litre Earthenware Vessels, approx. 6 ft. 2 in. by 4 ft. 10 in. diam., approx. 2 in. thick. Open-topped, fitted with loose fitting domed cover having 8 in. centre hole with loose lid, and two 2-in. inlets, one 1½-in. bottom side outlet.
- One**—Brierley, Collier & Hartley steam-heated **MIXER**, vertical screw lifting gear to pan arm, capable of holding 18 in. diam. Pan. Spring relief valve, pipes and fittings.
- One**—Vertical cylindrical m.s. riveted steam-jacketed **MIXER**, 5 ft. diam. by 4 ft. 3 in. deep by ½ in. plate, shafted bottom. Vertical agitator shaft carrying two paddle agitators running in footstep bearing and overdriven through bevel gears, mounted on single horizontal shaft.

GEORGE COHEN SONS & CO., LTD.,
SUNBEAM ROAD, LONDON, N.W.10.
 Tel.: Elgar 7222, and

STANNINGLEY, Nr. LEEDS
 Tel.: Pudsey 2241

'Phone 98 Staines

JACKETED Steel Vacuum Oven 7 ft. long by 3 ft. diam. Unused Weir Surface Condenser (G.M.) 138 sq. ft. Melvin 3 Speed 80 quart Bowl Mixer. Jacketed C.I. Mixing Pan 4 ft. 6 in. by 2 ft. 6 in. Welded Steel 5,000 Gallon Cyl. Tank.

HARRY H. GARDAM & CO. LTD.,
STAINES.

FOR SALE

MORTON, SON & WARD LIMITED

—OFFER—

AIR COMPRESSORS AND RECEIVERS

- ONE**—140 cu. ft. per min. at 70 lb. per sq. in. w.p. Tilghman vertical 8 in. by 6 in. single cylinder double acting water cooled air compressor, 400 r.p.m., complete with vertical riveted air receiver 6 ft. by 3 ft. diam. by ½ in. plate, with safety valve, etc.
- ONE**—100 cu. ft. per min. at 100 lb. per sq. in. Tilghman vertical 7 in. by 6 in. single cylinder, double acting water cooled compressor, 400 r.p.m. Complete with vertical riveted air receiver, 6 ft. 6 in. by 3 ft. diam. by ½ in. plate.
- ONE**—50 cu. ft. per min. at 100 lb. per sq. in. Broom & Wade vertical enclosed twin cylinder 4 in. by 4 in. compressor, 700 r.p.m., driven through vee ropes from 10 h.p. Higgs slip ring motor 1,440 r.p.m., 400 volts, 3 phase, 50 cycles with airdale automatic control panel and vertical riveted receiver, 4 ft. by 1 ft. 6 in. by ½ in. plate. (Almost unused).
- FOUR**—16 cu. ft. per min. at 70 lb. per sq. in. Levis vertical single cylinder 3½ in. by 4 in. air cooled compressors, 750 r.p.m., driven through vee ropes from 3 h.p. Higgs 1,440 r.p.m. motors, 400/3/50 cycles, with Brook starters. (New and unused.)
- FOUR**—Welded receivers for above, 1 ft. diam. by 4 ft. 6 in. long by 70 lb. per sq. in. w.p.
- MORTON, SON & WARD LTD.,**
WALK MILL, DOBCROSS, Nr. OLDHAM.
 'Phone-Saddleworth 437

BELT Driven Elevator, steel cased, 2 ft. by 1 ft. by 16 ft. long, 14 ft. centres, 6 in. belt steel buckets 5 in. by 4 in. by 3½ in. by 12 in. centres feed hopper, fast pulley. Price £75. **THOMPSON & SON (MILLWALL) LTD.**, 60 Hatcham Road, Ilerton Road, S.E.15. Phone: East 1844.

BIRLEC Activated Alumina Dryer for combustible gases or air capacity 8,000 c.p.h. to -40°C. dewpoint, electrical reactivation. Twin dryers with cooler, transformer instrument panel. In good condition, price only £265. Apply in writing to H. GREEN, 35, Dryclogh Road, Crossland Moor, Huddersfield.

CHARCOAL, ANIMAL AND VEGETABLE, horticultural, burning, filtering, disinfecting, medicinal insulating; also lumens ground and granulated; established 1890; contractors to H.M. Government.—**TROS. HIRZ-JONES LTD.**, "Invicta" Mills, Bow Common Lane, London, E. Telegrams, "Hill-Jones, Beccubch, London." Telephone: 3285 East.

ROTARY VACUUM FILTER

Drum cell type. 4 ft. 7½ in. diameter × 2 ft. 7½ in. wide. Filter surface 35 sq. ft. 2 h.p. 4-speed motor with starter. Makers, International Combustion Co. Ltd. Brand new condition £1,350

RYLATT & CO.,

64 Fountain St., Manchester
 TELE: BLACKFRIARS 9956

FOR SALE

BROADBENT 48-in. HYDRO EXTRACTOR, vulcanised basket, electrically under-driven 3-point suspension. Complete with starting equipment, fitted reverse current braking switch.

BROADBENT 48-in. HYDRO EXTRACTOR, with 48-in. galvanised iron basket, complete as above.

BROADBENT 48-in. SUSPENDED TYPE HYDRO EXTRACTOR, overdriven from 15 h.p. motor 400/3/50 supply, together with Pony motor for slow running.

BROADBENT 26-in. HYDRO EXTRACTOR, 3-point suspension underdriven from 5-h.p. motor 400/3/50 (all enclosed).

JOHNSON TIMBER PLATE AND FRAME FILTER PRESS, having 29 plates and 30 frames, forming cakes 3 ft. 3 in. by 1 ft. 10 in. by 1 in. Hydraulic closure (now working).

JOHNSON TIMBER PLATE AND FRAME FILTER PRESS, 28 plates and 29 frames, cakes 2 ft. 1 in. square by 1½ in./closure (two available). Double toggle.

CANNING ALL RUBBER PLATE AND FRAME FILTER PRESS, having 5 plates and 6 frames in hard, pliable black rubber, forming cakes 13 in. by 10 in. by ½ in. thick. Press complete with C.I. head and standard vulcanised over contact faces and outer edges.

18-in. DIA. WILKINSON OINTMENT MILL, with marble refining discs and enamelled hopper and agitator and complete with driving motor.

TUNGSTONE ACID PUMPS, a number available in ebonite, bronze and tufnol.

**NEWMAN INDUSTRIES LIMITED,
YATE, BRISTOL**

DISINFECTORS Two 8 ft. by 5 ft. diam. jacketed. Four 7 ft. by 3 ft. diam. with coils. Two Oval 50 in. by 30 in. by 7 ft. jacketed. New condition. **THOMPSON & SON (MILLWALL) LTD.**, Cuba Street, London, E.14. Tel. East 1844.

STAINLESS STEEL TANKS

FIFTEEN standard sizes from 25 gallons to 3,000 gallons capacity, new stainless steel tanks lowest prices on the market for all purposes round or square with or without lids, cradles, and trolleys, jacketed vessels for all pressures.

We specialise in finding unusual plant for clients. See our monthly circular for an extensive range of chemical, food, paint, power, hydraulic and confectionery and plastic and rubber plant for sale new and secondhand.

R. F. PAGET Ph.D., C.C.I.
Chemical Engineer

Manor House, Barwick in Elmet, Leeds.

METAL Powders and Oxides. Dohm Limited, 167, Victoria Street, London, S.W.1.

DELIVERY FROM STOCK

NEW STAINLESS STEEL Open Top Vertical Cylindrical Storage Tanks of 25, 50, 100 and 250 gallons capacity, fitted with or without loose lids, and lifting handles.

New Stainless Steel Cylindrical Tanks, 50 and 100 gallon capacity, mounted in Mild Steel Cradle with Rubber Tyred Castors.

New Stainless Steel Water Jacketed Pans, inner cylindrical vessel fitted into square outer Mild Steel Tank mounted on four angle iron legs, with connections, 25, 50, 100 and 200 gallons capacity, suitable for oil, water, gas and electricity heating, also for steam at atmospheric pressure.

Also Mild Steel Jacketed Pans for 50 lb. and 80 lb. working pressure, 20/300 gallons capacity.

Please offer us your redundant plant—we have customers waiting and will pay top prices.

The MANICRAFT ENGINEERING COMPANY LTD.,
Pryme Street Mills,
off Chester Road, Hulme, Manchester, 15.

SURPLUS RE-CONDITIONED CHEMICAL PLANT & MACHINERY

for

IMMEDIATE DELIVERY

State your requirements

to

HODSON & CO. (MACHINERY) LTD

TOTTINGTON · BURY · LANCs

PHONE: TOTTINGTON
123

FOR SALE

TWO Gardner Sifter Mixers, 1 cwt. capacity. New ball mill, C.I., 3 ft. diam. by 22 in. New Cask Vibrating Machine. Seitz Filter Press, 24 in. by 24 in. Rotary 15 Die Tablet Press. Box No. 2687, THE CHEMICAL AGE, 154 Fleet Street, London, E.C.4.

1 Hydraulic Baling Press.

1 Shirlife Baling Press.

2 Vertical Weir & Hall Steam Pumps.

Several small steam-jacketed Copper Pans.

Several Ball Mills, 6 ft. 6 in. by 6 ft. 8 in., Silex-lined batch type, with driving gear and clutch.

3 Simon type Portable Slat Conveyors, 20 ft. long, for boxes or bags.

Lacey-Hulbert Motorised Compressor, capacity 4 cu. ft. 2,000 lb. pressure.

Mixing Pan, 6 ft. dia. by 5 ft. deep, flat bottom, open top.

Ditto, 3 ft. dia. by 5 ft. deep, flat bottom, open top.

2—6 in. Centrifugal Pumps by Cherry.

2 vertical cross tube Boilers 80 lb. pressure, 8 ft. by 4 ft. and 7 ft. 6 in. by 3 ft. 6 in.

Milton Grinders fitted with 30 in. vertical stones, belt driven with shaker feeds.

1 Ivel 20 in. Turbine Centrifugal Extractors with spare baskets.

20 steel built Portable Soap Frames 15 in. wide, mounted on wheels.

Steam Jacketed Gardner pattern Mixer about 30 gallons capacity.

Brook 60 h.p. A.C. motor, 346/3/50.

Brook 80 h.p. A.C. motor, 346/3/50.

4 vertical Hall Ammonia Compressors, single cylinder, belt driven cylinders 3 in. to 5 in. bore.

3 Alfa-Laval Disc Separators, belt driven, size 45 and 65, with chambers 12 in. and 15 in. dia.

2 unused belt driven Ram Pumps, fitted one ram 1½ in. dia., 8 in. stroke, brass fitted.

Alpine type Ferplex Grinder, chamber 20 in. dia.

Ditto similar, chamber 18 in. dia.

Single pair toothed Crushing Roll, belt and gear driven, last used for soap crystals.

4 Steam Jacketed Mixing Pans.

1 20 cwt. Friction Hoist, complete with wheel and jib.

Several A.C. motors, 3-10 h.p.

Write: **RICHARD SIZER LIMITED, ENGINEERS**

CUBER WORKS, HULL

1000 STRONG NEW WATERPROOF APRONS, To-day's value 5s. each, Clearing at 30s. dozen. Also large quantity Filter Cloths, cheap. Wilsons Springfield Mills, Preston, Lancs. Phone 2198.

SERVICING

DOHM, Ltd., pulverise raw materials everywhere. 167, Victoria Street, London, S.W.1.

GRINDING, Drying, Screening and Grading of materials undertaken for the trade. Also Suppliers of Ground Silica and Fillers, etc. **JAMES KENT, LTD.**, Millers, Fenton, Staffordshire. Telegrams: Kenmill, Stoke-on-Trent. Telephone: 4253 and 4254, Stoke-on-Trent (2 lines).

GRINDING of every description of chemical and other materials for the trade with improved mills.—**THOS. HILL-JONES, LTD.**, "Invicta" Mills, Bow Common Lane, London, E. Telegrams: "Hill-Jones, Bochurch, London." Telephone: 3285 East.

LONDON FIRM offers complete service packing powders of all descriptions, also liquids and chemicals. Long runs only. Containers and packing cases for home and export, made on premises. Near to docks. Own rail sidings. Box No. 2331, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

WANTED

ANY kind of Merchandise bought for cash. Govt. surplus, redundant stocks, job lines, anything. Write G.T.C. 82/94, Seymour Place, London, W.1.

WANTED.—Supplies of Nitre Cake in ten-ton lots, Box No. 2120, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

Well established and introduced firm in Egypt

wishes to contact British Manufacturers of
HEAVY & FINE CHEMICALS

Please write with full particulars to:—

FELIX LEVY

P.O. Box No. 1718, Alexandria, Egypt.

J. H. COLLIE & Co. Ltd.

Hydrometer Manufacturers and Scientific Glass Blowers.

Enquiries are solicited for all types Hydrometers. Thermometers, etc., Special Types made to instructions.

Reasonable delivery dates

92, HAMILTON ST., BIRKENHEAD

Grams & Cables:
Guidor Birkenhead

Phone:
Birkenhead 4330

1 CWT. KEGS
—7 DAY DELIVERY—

COOPERED IRON HOOPED
KEGS SUITABLE FOR DRY
MATERIALS MEASURING
13" X 22"

DESIGNED AND MANUFACTURED
BY US SPECIALLY FOR THE
HOME & EXPORT CHEMICAL
TRADES.

Sample on request

GEO. W. ORR & Co. Ltd.
8 COUSTONHOLM ROAD,
GLASGOW, S.3.

Telegrams: Containers, Glasgow. Telephone: Largside, 1777.

Products of the

Lennox Foundry Co. Ltd.

include all alloys of Copper and aluminium, for the Chemical Industry.

Glenville Grove, London, S.E.8
Specialists in corrosion problems

**DECOLOURISING CARBON
BLEACHING EARTH
BENTONITE**

Telephone :
Woolwich 1158
(2 lines)

WRITE FOR
SAMPLES AND
QUOTATIONS

Telegrams :
Scofar, Wol.
London

FARNELL CARBONS LIMITED
Conduit Road, Plumstead, London, S.E.18

**BELTING
AND
ENDLESS VEE ROPES**

**Superlative Quality
Large Stocks - Prompt Despatch**

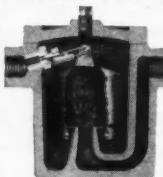
FRANCIS W. HARRIS & Co. Ltd.

BURSLEM - Stoke-on-Trent

'Phone : Stoke-on-Trent 87181-2

'Grams : Belting, Burslem

STEAM TRAPS
FOR ALL PRESSURES AND DUTIES



WE SPECIALISE
IN ENGINEER'S
REQUIREMENTS FOR
THE CHEMICAL AND
ALLIED TRADES

**BRITISH STEAM
SPECIALTIES LTD**
WHARF ST. LEICESTER

Stocks at: London, Liverpool, Bristol,
Whiston, Glasgow, Manchester, & Newcastle-on-Tyne

**Manufacturers of
Aniline Colours
and Pigments**

*Pattern Cards
on Request*

**ORGANIC
DYESTUFFS
LIMITED**
Pendleton Mills,
Croft-st., Pendleton

Tele: Pendleton 1031
'Grams: "Fascolour, Manchester"

Mirvale



Cresylic Acid

CRESOLS, PHENOL
HIGH BOILING TAR ACIDS
CRESYLIC CREOSOTE
NAPHTHALINE, PYRIDINE

MIRVALE CHEMICAL CO. LIMITED
MIRFIELD, YORKS. Phone Mirfield 1157

The FLOOR of AGES

RESISTS

ACIDS AND ALKALIS

INSTALLED by a variety of industries for its rock-like permanence, The Floor of Ages also adds acid and alkali resistant to its honours. And rightly so. Exacting practical tests prove conclusively that The Floor of Ages is an effective, permanent resistant that is saving time and money for leading firms at home and abroad.

If you would like to know how The Floor of Ages can solve YOUR problem, simply write or phone our Technical Dept.

TANK LININGS

Bolton & Hayes are specialists in linings for bleaching cisterns,



formaldehyde storage tanks, and acid and alkali vats, etc.

BOLTON & HAYES LTD.

VIKING HOUSE
Manchester Road, Bolton Tele. 4067

CALLOW ROCK

Gas-Burnt

LIME

for all purposes

• • •

QUICKLIME

(Calcium Oxide)

of the highest commercial quality, in lumps or in coarse powder form

HYDRATED LIME

(Calcium Hydroxide)

in Standard and Superfine grades to meet most industrial requirements

• • •

The Callow Rock Lime Co. Ltd
CHEDDAR Somerset

Agents: DURHAM RAW MATERIALS, LTD.,
1-4, Great Tower Street, LONDON, E.C.3.

A COMPREHENSIVE

ACID-PROOFING

ORGANISATION
FOR ALL TRADES
AND INDUSTRIES
BACKED BY 21
YEARS' EXPERIENCE

FOR
FLOORS - CHANNELS
TANKS (storage and process)
DRAINAGE - NEUTRALISING
CHIMNEY and TOWER LININGS
(chemical)

PRODORTE

LTD.

HEAD OFFICE & WORKS :
WEDNESBURY, STAFFS
Telephone : 0284 (5 lines)

LONDON OFFICE :
ARTILLERY ROW S.W.1
Telephone : 1547-8 Abbey



THE CASTLE
ENGINEERING CO.,
(NOTTINGHAM) LTD.
HASLAM ST., CASTLE BOULEVARD
NOTTINGHAM

PHONE: NOTTINGHAM 4698 (3 Lines)
GRAMS: CAPSTAN, NOTTINGHAM

ON AIR MINISTRY, ADMIRALTY AND
WAR OFFICE LISTS

**REPETITION WORK
IN ALL METALS**



"STILL LEADING"
For **CHEMICAL & ALLIED TRADES**
ACID RESISTING
CEMENTS & LININGS

For **PICKLING TANKS, FLOORS,**
DIGESTERS, KIERS,
STONE, CONCRETE,
BRICK, WOOD,
IRON VESSELS
& ACID
TOWERS

PICKLING TANKS 40 FEET LONG WORKING SUCCESSFULLY

RIZISTAL

AN ALL BRITISH PRODUCT

RESISTS
Formaldehyde,
Alcohol, Oils, Greases
and Tar Acids, Benzene,
Toluene Compounds HCl,
H₂SO₄, HNO₃, and H₂PO₄,
mixed HNO₃ and HF Acids,
Aqua Regia, Formic, Acetic, Lactic,
Oxalic, Chromic Acids, Bisulphites,
Hypochlorites, Mixed Acids, Peroxides,
Nascent Halogens and Alkalies.

UNDER STEAM PRESSURES
OVER 50 YEARS' EXPERIENCE

SOLE MAKER
JOHN L. LORD
WELLINGTON CEMENT WORKS
BURY, LANCASHIRE

TELEGRAMS: "CEMENT"
PHONE: BURY 617



